

ISSN 1553-9768

Winter 2010

Volume 10, Edition 1

Journal of Special Operations Medicine

A Peer Reviewed Journal for SOF Medical Professionals

Volume 10, Edition 1 / Winter 10

Journal of Special Operations Medicine

ISSN 1553-9768

THIS EDITION'S FEATURE ARTICLES:

- Special Operations Individual Medical Equipment Part 2 – The In-Use and Survival Medical Kits
- Medical Seminars: A New Paradigm for SOF Counterinsurgency Medical Programs
- Evidence-Based Diagnosis and Management of mTBI in Forward Deployed Settings: The Genesis of the USASOC Neurocognitive Testing and Post-Injury Evaluation and Treatment Program
- Evaluation and Treatment of Persistent – Cognitive Dysfunction Following Mild Traumatic Brain Injury
- Dislocation of the Knee: Imaging Findings
- Monkey Bite Exposure Treatment Protocol
- Canine Tactical Field Care Part Three – Thoracic and Abdominal Trauma

Dedicated to the Indomitable Spirit & Sacrifices of the SOF Medic

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE 2010		2. REPORT TYPE		3. DATES COVERED 00-00-2010 to 00-00-2010	
4. TITLE AND SUBTITLE Journal of Special Operations Medicine. Volume 10, Edition 1, Winter 2010				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) United States Special Operations Command (USSOCOM),SOC-SG,7701 Tampa Point Blvd,MacDill AFB,FL,33621-5323				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 120	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

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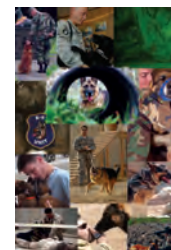
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The Winter 2010 cover of the JSOM is a collage of images dedicated to the military working dogs (MWDs). The images were retrieved from <http://www.defenseimagery.mil/index.html>. Captions to the images are in the Photo Gallery on pages 111-112.



From the Editor

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- Be based on a perceived or demonstrated educational need which is documented
- Be intended to meet the continuing education needs of an individual physician or specific group of physicians
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- Have content which is appropriate for the specified objectives
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- Use evaluation mechanisms defined to assess the quality of the activity and its relevance to the stated needs and objectives

To qualify for 1 CME, it must take 60 min to both read the article and take the accompanying test. To accomplish this, your articles need to be approximately 12 – 15 pages long with a 10 – 15 question test. The JSOM continues to survive because of the generous and time-consuming contributions sent in by physicians and SOF medics, both current and retired, as well as researchers. We need your help! Get published in a peer-review journal NOW! See General Rules of Submission in the back of this journal. We are always looking for SOF-related articles from current and/or former SOF medical veterans. We need you to submit articles that deal with trauma, orthopedic injuries, infectious disease processes, and/or environment and wilderness medicine. More than anything, we need you to write CME articles. Help keep each other current in your re-licensure requirements. Don't forget to send photos to accompany the articles or alone to be included in the photo gallery associated with medical guys and/or training. If you have contributions great or small... send them our way. Our e-mail is: JSOM@socom.mil.

Lt Col Michelle DuGuay Landers

Dedication



SSG Andrew T. Lobosco



SSG Andrew T. Lobosco, 29, was killed 22 August 2009 while conducting a dismounted patrol in the vicinity of Yakhchal, Afghanistan, in support of combat operations while serving with Company C, 2nd Battalion, 7th Special Forces Group (Airborne).

He deployed in support of Operation Enduring Freedom in July 2009 as a member of the Combined Joint Special Operations Task Force – Afghanistan. This was his second deployment in support of the Global War on Terror. He was a Special Forces medical sergeant.

Lobosco a native of Somerville, NJ, enlisted into the U.S. Army January 2004 as a Special Forces candidate. He completed the Special Forces Qualification Course in January 2007 and earned the coveted "Green Beret."

Lobosco's military education includes the Warrior Leader's Course, Basic NCO Course, Survival, Evasion, Resistance and Escape Course, Basic Airborne Course, and Special Forces Qualification Course.

His awards and decorations include the Bronze Star Medal, Purple Heart Medal, Army Good Conduct Medal, National Defense Service Medal, Global War on Terrorism Service Medal, Non-Commissioned Officer Professional Development Ribbon, Army Service Ribbon, NATO Medal, Combat Infantryman Badge, Parachutist Badge, and the Special Forces Tab.

Lobosco is survived by his parents and sister of Bridgewater, NJ.

MEDIC RECOGNITION



COL Peter Benson, USASOC Surgeon, presents Sergeant First Class Owen Wendelin, a medical sergeant assigned to 5th Special Forces Group (Airborne) with the USASOC SF Medic of the Year Award December 11. Wendelin competed against 18 other soldiers from throughout USASOC to earn the award. (Photo provided by 5th SFG(A))

SFC Owen Wendelin was assigned to B Company, 5th Special Forces Group (Airborne) in July 2005 as a Special Forces Medical Sergeant. SFC Wendelin deployed in support of Operation Iraqi Freedom III and IV with ODA 555; and to Afghanistan in support of Operation Enduring Freedom with ODA 5226. During each deployment he rendered essential medical aid which saved the lives of many local nationals and fellow Soldiers on numerous occasions.

One recent example of his outstanding combat medical skills occurred during a two-day patrol in July 2009 in Afghanistan. The team was systematically clearing small compounds to establish a rest-over night site. The team began receiving small arms fire, machinegun fire, and RPG rockets from all directions. Effective enemy fire and actions on contact by a partner force bred confusion and chaos. SFC Wendelin was one of four U.S. Special Forces (USSF) Soldiers with 18 indigenous forces defending the southernmost portion of the compound. During the exchange of fire, two USSF Soldiers were shot; one in the thigh and the other in the leg and backside. SFC Wendelin moved to the first wounded USSF Soldier, exposed under heavy, accurate enemy fire, assessed him, and began rendering life-saving aid. The tactical situation required him to return fire while applying pressure to a femoral artery injury prior to application of a tourniquet. SFC Wendelin then resumed effective fire to repel advancing enemy forces. Upon hearing there was a second USSF Soldier wounded, SFC Wendelin immediately moved to that position with complete disregard for his own safety. The second casualty was already receiving buddy aid from a team member. SFC Wendelin provided expert advice and assistance to his teammate to ensure the wound was hemostatic and dressed to his satisfaction. Once again, in disregard for his own safety, he ran from cover and returned to the first casualty to reassess him and prepare him for evacuation. Wendelin drafted the Nine-Line and gave it to the Detachment Commander to call

for MEDEVAC. SFC Wendelin singlehandedly moved the casualty to cover, and then to the pick-up zone (PZ). He called for the second USSF Soldier to be brought to the PZ. The first MEDEVAC landing was aborted due to brown-out and enemy small arms fire. SFC Wendelin provided suppressive fire and orchestrated the second attempt, which succeeded. He helped load the casualties onto the helicopter, rendered a concise report to the flight medic, and returned to the fight. Throughout the entire incident, SFC Wendelin remained calm and collected, with 100% control of the situation. SFC Wendelin's efforts not only saved the lives of two Special Forces Soldiers, but his composed, professional demeanor instilled faith in the defenders of the compound and rallied them in their successful efforts to defend it.

"I was just doing my job," Wendelin said, exemplifying the "Quiet Professional" motto of Special Forces.

Service in combat is not the only consideration for the award. Duty performance while in garrison is also a factor. When not deployed, Wendelin trained other Soldiers in the principles of tactical combat casualty care. His performance as a Special Forces medic sets the example for all future Special Forces medics. His actions were integral to his team's success and brought great credit upon himself, 5th Special Forces Group (Airborne), and the United States Army.

SFC Wendelin has been serving as a SF medical sergeant for four years, and has deployed twice to Iraq and once to Afghanistan. He is currently with B Company, 2nd BN, 5th SFG (A).

The USASOC Surgeon, COL Peter Benson, presented Wendelin the award at the 2009 Special Operations Medical Conference (SOMA) in Tampa, Florida. Benson said the award represents the best of the best among Special Operations medical sergeants.

The USASOC Medic of the Year award is presented annually to a medical sergeant who has exhibited exemplary performance. Last year's award went to SFC Eric Strand, of 3rd Battalion, 5th SFG (A).

Special Operations Individual Medical Equipment Part 2 – The In-Use and Survival Medical Kits

Dirk Geers

ABSTRACT

Special Operations Forces (SOF) Operators need a variety of individual medical items that can generally be broken down into three types of medical kits: a major trauma kit, to treat major traumatic wounds; an in-use medical kit, to prevent or treat anticipated common medical conditions during operations; and a survival medical kit, to treat minor injuries and ailments when in a survival/evasion situation.

AIM

The aim of this article, the second in a two-part series, is to provide insight on how to custom-build an individual in-use medical kit and survival medical kit for SOF.

OPERATIONAL REQUIREMENTS

An in-use medical kit allows SOF Operators to prevent or treat injuries and ailments likely to occur and require immediate attention, or to prevent potential mission-degrading medical conditions on a routine basis. A survival medical kit should allow a SOF Operator in a survival/evasion situation to treat a reasonable range of anticipated injuries and ailments in order to allow him the ability to evade back to friendly positions or await recovery. These kits should be small, durable and light.

CONDITIONS FOR USE

The kit allows a SOF Operator to provide basic self-care without having to rely on the team medical pack or when no collective medical supplies are available, i.e. when a team is split to conduct a short-duration task without a medic.

Contents from a survival medical kit should only be used when in a survival/evasion situation, i.e. when an SOF Operator is definitively separated from his team, if evading with others, or when cut-off from any collective medical supplies, such as those carried in the team medic's medical pack.

CRITERIA FOR SELECTING KIT CONTENTS

The kits should meet the operational requirements listed above. A balance should be sought between light weight and compactness on the one hand, and comprehensiveness on the other. A sensible approach is to limit kit contents to items most likely to be needed and those of greatest importance.

During mission execution or when evading, SOF personnel may find themselves in remote areas, encountering environmental hazards similar to those faced by wilderness travelers.¹ Based on this assumption, identifying the most common medical problems encountered during wilderness travel will help to select kit contents, realizing that tactical considerations should be taken into consideration. Invaluable additional information may be available from classified sources, such as survival, evasion, resistance, and escape (SERE) products.

Various common medical problems have been reported during outdoor activities, including foot blisters, gastrointestinal disorders, cuts, abrasions, bites, stings, infections of the skin and upper respiratory tract, musculoskeletal injuries, and pain/aches.²⁻¹² Contents should reflect health threats specific to the theatre of operations, e.g. altitude and endemic diseases, as well as specific personal medical requirements, such as allergies. Temperature range and humidity are also important considerations, e.g. certain medical products do not remain stable in hot humid climates, although conclusive data is not readily available for most medications.¹³

Other factors dictating the kit's contents are the individual's level of medical proficiency and the availability of controlled medicines. As a survival medical kit is intended to be used by an isolated individual, this shouldn't contain any items that cannot be used on oneself.

POSSIBLE CONTENTS

Taking into account the above criteria, possible contents are listed as follows:

Wound cleansing items

Wound cleansing materials have to be included in order to prevent wound infection. Several survival

manuals recommend potassium permanganate to be included as an antiseptic, due to its potential use for other applications as well,¹³⁻¹⁶ but its effectiveness is seriously questioned.¹⁷ Even for more commonly used antiseptics such as povidone iodine and chlorhexidine, there seems to be no consensus as to their advantage to clean a contaminated wound.^{18,19} Apart from their questionable effectiveness, there is some concern over the safety of antiseptics on open wounds, as they may be toxic to cells essential to wound healing, although this may be dependent on the concentration.^{20,21}

Whereas data on the effectiveness of antiseptics remains inconclusive at best, it seems to be much more accepted that wound irrigation is an effective and preferred method for wound cleansing.²²⁻²⁴ When using water to irrigate a wound, potable water seems to be adequate, if not better, than normal saline.²⁵⁻³²

Pressure required for irrigation is an important consideration; forcefully injecting the irrigant solution with a syringe through an 18 to 20 gage plastic catheter (without the needle) held about ½"-1" from the wound, generates sufficient pressure.³³⁻³⁶ Low pressures generated by piston syringes without a catheter or by bulb syringes, are not adequate.^{37,38} Specially designed irrigation syringe tips are commercially available. (Figure 1) One model integrates a shield to protect against splashes. While it works well, this protection is not required for self-aid, in addition, the device is bulky and being made of polystyrene, it is relatively fragile.



Figure 1: Irrigation syringe with dedicated and improvised 18g tips

Although the optimal volume required is unknown,³⁹ at least 100-300ml may have to be used until visible contamination is removed.⁴⁰ These

amounts of water fall within the limits of what can realistically be expected to be carried by dismounted individuals.

Wound irrigation is probably as effective as cleaning a wound with gauze swabs,⁴¹ which along with tweezers, may still be required if embedded particles cannot be removed by irrigation.⁴²

Wound dressings and tape

It is recommended that once a wound has been cleaned it should be covered with a dressing to prevent further contamination. Traditional wound dressing materials include non-adherent dressings (as an initial layer), gauze pads (to absorb wound exudate) (Figure 2), and bandages, as well as adhesive tape or retention

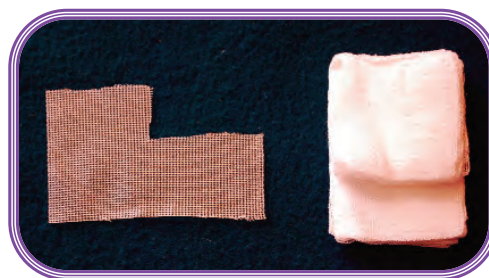


Figure 2: Non-stick dressing (left) and gauze pads (right)

sheets, to keep the dressings in place and further protect wounds. For small wounds, combined adhesive dressings/bandages are more convenient.

Protecting wounds from the environment with traditional dressings is not easy, and even when kept dry, they should be changed regularly. Moisture vapor permeable adhesive film dressings (consisting of a thin vapor-permeable polyurethane film sheet, coated with an adhesive) can be applied to superficial wounds with minimal exudate, and can also be used as a secondary dressing to keep other dressings in place.⁴³ (Figure 3)



Figure 3: Adhesive film dressings

Hydrocolloid dressings (which are thicker and contain gel-forming agents that absorb liquid and keep the wound hydrated) are better able to cope with wound exudate production.⁴⁴ (Figure 4) Both types are impermeable to micro-organisms and liquids and can remain in place for several days. Some are individually sealed in a waterproof package, some also have integral gauze pads (providing an all-in-one composite dressing), and some provide enhanced adhesion for use in hot and humid environments. These dressings should be large enough to adhere to the skin up to about an inch from the wound edges.



Figure 4: Hydrocolloid dressings

While some wilderness medicine handbooks mention a requirement for primary dressings to be sterile,^{45,46} other manuals simply recommend clean dressings.^{47,48} The benefits of more expensive sterile over non-sterile dressings are far from clear.^{49,50}



Figure 5: Blister dressings

ture vapor permeable adhesive film and hydrocolloid dressings can be used to prevent and treat blisters as well. (Figure 5) When selected to be used on feet, many have to be covered with tape to keep them in place and/or to protect them from friction.

Tape can also be used on its own to prevent blisters. Sheets, such as self-adhesive, non-woven fabric dressing retention sheets, or tape rolls with a peel-off backing, are much more convenient than most rolls of tape where the tape sticks to itself, as the required amount and sizes can easily be cut and stored flat, thus usually taking significantly less space, while they can also easily be split over different kits or kit components. (Figure 6)



Figure 6: Self-adhesive tape and dressing retention sheets with peel-off backing

both can be improvised using other types of adhesive tape.

Skin adhesive

In order to improve the adhesive power of tape, wound closure strips, and blister dressings, a skin adhesive may be required. Compound tincture of benzoin, or Friar's balsam, is widely used, but may not always be able to sufficiently augment adhesion in wet environments.⁵³ Preparations containing gum mastic reportedly provides better adhesive strength than those based on benzoin.^{54,55} (Figure 7)

Skin cleaning fluid

An alcohol-based skin cleaning fluid is useful to clean the skin before applying adhesives so they will stick better. Some types are claimed to also toughen the skin, which is useful as a blister prevention measure,⁵⁶ but firm data confirming this characteristic is lacking.

Although specifically designed primary and secondary dressings exist to preventively mask friction-prone skin areas and/or to cover them following development of blisters, the aforementioned moisture



Figure 7: Gum mastic (left) and compound tincture of benzoin (right) skin adhesives

Foot powder

Foot powder may help to prevent friction blister formation on feet. Many types are only of benefit for a short while and actually increase the occurrence of blister formation when used longer than one hour, while aluminum-containing antiperspirants may work better for long-duration use.⁵⁷ Foot powder is also useful when using tissue adhesives to reinforce blister dressings, where it can be sprinkled after applying the dressing, in order to neutralize any adhesive extending beyond the margins of the dressing, preventing socks from sticking to the skin or to the dressing⁵⁸.

Lubricants

Lubricants are useful to prevent or alleviate the painful effects of chafing by clothing or equipment against the skin, which depending on the individual, typically occurs on the inner thighs when sweating heavily or when clothing gets wet from rain. Care should be taken when selecting a product that is intended primarily to be applied to the feet, as just like some foot powders, they may increase the incidence of blisters during long-duration activities.⁵⁹ Bottles with a roll-on applicator are often bulky and heavy and may easily leak their greasy contents. A semi-solid lubricant such as petroleum jelly (petrolatum, soft paraffin) is more convenient and can also be used to protect the lips from the wind, or to soothe cracked skin. Vaseline gauze can be used for treatment of injuries and can also serve as a candle when needed.

Analgesics

Different types of painkillers should be carried. An antipyretic analgesic provides relief for minor pain, and also reduces fever. Acetaminophen (called paracetamol in Europe) is the usual drug of choice. Acetylsalicylic acid (aspirin) is to be avoided, as it acts as a blood thinner (impeding blood clot formation in case of bleeding) and is more easily affected by heat and humidity. Anti-inflammatory analgesics provide relief for mild to moderate pain, and are useful for musculoskeletal pain such as sprains and bone injuries. Traditional non-steroidal anti-inflammatory analgesics, such

as ibuprofen, also interfere with the blood's ability to clot and are better replaced by newer types such as meloxicam. For moderate to severe pain, a stronger analgesic may be added.

Antidiarrheals

As diarrhea is a very common outdoor problem, it is important to carry bowel motion inhibitors such as loperamide. While these only treat the symptoms of diarrhea and not the underlying cause, their usefulness lies in the fact that they limit the number of stools, an important consideration while on the move.

Antiemetics

Antiemetics are especially useful where there is a risk of dehydration, if vomiting interferes with fluid intake, or to prevent vomiting (as an anticipated side-effect) prior to taking other medication such as some antimalarials.⁶¹

Antitussives

Coughs are a common symptom associated with respiratory infections that are rarely life-threatening and usually self-limiting.⁶² While symptomatic treatment may not be medically necessary, tactical considerations may require antitussives to be carried. Codeine phosphate is commonly used as an antitussive. It can also be used as an analgesic (alone or in combination with acetaminophen, providing stronger analgesia than either acetaminophen or codeine alone),⁶³ or to treat diarrhea.^{64,65}

Antibiotics

Oral antibiotics to treat (bacterial) diarrhea are routinely recommended for travelers going to tropical/remote areas,^{66, 67} and often antibiotics for skin infections and for respiratory infections are recommended as well.^{68,69}

Once antibiotic treatment is started, it is important to take a full course, often continuing for at least a couple of days after the signs and symptoms of infection have disappeared. Depending on tablet/capsule size and the number of daily doses required, this means that antibiotics can take up considerable space, so ideally, a single broad-spectrum antibiotic should be selected. Quinolones such as ciprofloxacin or levofloxacin may be effective to treat all the aforementioned infections, but more than one antibiotic may be required in case of quinolone allergy.^{70,71} An additional advantage of ciprofloxacin is its stability long after the manufacturer's expiration date, even under hot and humid conditions.⁷²

Although included in recommended personal medical kit lists of several wilderness medicine handbooks,⁷³ topical eye antibiotics should not be generally included in individual medical kits, as using them for the wrong disorder might do more harm than good.⁷⁴

Correct self-diagnosis of eye disorders by non-medical personnel is difficult in the field, and even if the knowledge was present, several diagnostic items would still be required.⁷⁵

Antihistamines

Antihistamines are useful for treating the symptoms of allergic reactions, especially after insect bites and stings. Although some survival manuals recommend antihistamine cream to be carried,⁷⁶ topical antihistamines can cause skin sensitization and may be less effective,⁷⁷ so it is better to select a long-lasting non-sedating oral antihistamine (e.g. cetirizine).

Antimalarials

Malaria is an infectious disease that occurs in those (sub)tropical areas in which *Anopheles* mosquitoes are present. Depending on the risk in the operational area (which may vary according to exact location, altitude, and season), antimalarials may have to be taken prophylactically, in addition to other measures, as no single preventive measure is 100% effective. The exact type depends on several factors, including the geographical area and individual tolerance, and will have to be tailored to each individual.⁷⁸ As acute severe *falciparum* malaria is a medical emergency,⁷⁹ antimalarials for emergency self-treatment should be carried as well. They may be different from the drugs to be taken prophylactically.

Oral rehydration salts (ORS)

ORS sachets contain a balanced mixture of dry salts and carbohydrates, used to treat dehydration and sodium and potassium depletion due to excessive perspiration or diarrhea. While glucose-based ORS help maintain hydration, ORS containing rice-based complex carbohydrates are a better choice, as they also decrease stool volume, shorten the duration of diarrhea, and more effectively promote water absorption.⁸⁰⁻⁸³ (Figure 8)



Figure 8:
Glucose-based
(left) & rice-
based (right)
oral rehydration
salts

Insect repellent

Besides being a nuisance, insects can transmit many diseases and their bites usually cause local swelling and itching, which in turn may lead to secondary skin infection due to scratching. The use of insect repellent is an essential part of personal protective measures to avoid insect bites,⁸⁴ although it does not protect against stinging insects, such as bees and wasps.⁸⁵ Repellents containing KBR 3023 or containing DEET (N,N-diethyl-3-methylbenzamide, previously called N,N-diethyl-m-toluamide) work well, but many products containing essential oils (e.g. citronella) as the active ingredient, are only effective for a short while at best.⁸⁶ Higher DEET concentrations provide longer-lasting protection, but the increase in duration is disproportional in concentrations above 50%. Extended-release DEET formulations can prolong the protection without increase in concentration.⁸⁷ As repellents are unable to protect skin more than 4cm away from the application site,⁸⁸ correct application implies covering all areas of exposed intact skin, while ensuring they don't come into contact with the mouth, the eyes, open wounds, irritated skin, and in the case of DEET, also plastic spectacles or watches. Repellents are affected by environmental effects such as exposure to heat and humidity, so a large enough supply should be carried so it can be reapplied regularly.

Water disinfection tablets

While cooking might be the best option to kill harmful micro-organisms in water, this is often not possible in an evasion scenario, so water disinfection tablets should be carried. If a water filtration system is carried, additional treatment with chemicals will almost always be required anyway, since most filters alone cannot reliably remove viruses. Large-capacity individual systems that provide adequate disinfection are usually too bulky to be routinely carried on the body. Disinfection tablets provide a useful alternative in an evasion scenario, for almost no space/weight penalty.

Chlorine or iodine tablets are a traditional choice, but although effective against bacteria, viruses, and most protozoa, including highly resistant giardia lamblia cysts,^{8,9,90} they are not effective at practical doses and contact times against omnipresent and diarrhea-causing cryptosporidium oocysts.^{91,92} In addition, when using chlorine or iodine tablets, prior filtration to remove suspended particles will usually be required due to these disinfectants' reaction with organic material, leaving a reduced concentration available for disinfecting the water being treated. Either a dedicated device (e.g. Millbank bag) or an improvised filter will then have to be used. Portable water filters with sufficiently small pore sizes can eliminate cryptosporidium cysts, but may rapidly become clogged, if used to filter debris.⁹³

In spite of recommendations found in some survival manuals, potassium permanganate has no proven record of efficacy, while there are concerns over its toxicity.⁹⁴ Tablets containing silver ions as the only active ingredient are only effective against bacteria,⁹⁵ not against viruses and protozoa, and are merely intended to protect stored drinking water against (re)contamination. However, most waterborne pathogens, including cryptosporidium, can be inactivated by chloride dioxide,^{96,97} which can now be generated easily from relatively small tablets, providing a convenient water disinfection option in the field. If intelligence indicates that chemical pollution is present, a system integrating a carbon filter may be required.

Dental cavity filling

A temporary dental cavity filling is useful to treat toothaches caused by lost fillings or damaged teeth.^{98,99} The basic materials used for temporary fillings are zinc oxide and oil of cloves (eugenol), which will have to be mixed.¹⁰⁰ A very small tube containing a single material which hardens after contact with humidity (saliva) takes less space and is easier to use than a multi-component mixture.

Tweezers

Tweezers with a fine point are very useful in many environments to remove ticks or embedded objects (e.g. thorns, wood splinters) from the skin. (Figure 9)

Bite/sting suction device

In spite of manufacturers' claims and previous recommendations to use a mechanical venom suction



Figure 9: *Tweezers*

device immediately following snakebite,¹⁰¹ there seems to be no scientific proof that sufficient venom is removed to make any difference.¹⁰² While it also hasn't been proven that suction is harmful to humans,¹⁰³ there are some concerns that the concentration of venom under the suction cup may cause massive tissue necrosis.¹⁰⁴ The lack of evidence that it really works, means that carrying this relatively bulky device should be considered only if it is felt that it may be of psychological benefit, realizing that other treatment options, which may be fairly limited when isolated, should not be delayed by its use.

High-altitude medication

For high-altitude patrols, oral medications to deal with altitude-related illnesses should be carried by all patrol members.¹⁰⁵ Commonly used medications include acetazolamide (125mg tablets/capsules), nifedipine (20mg slow-release tablets/capsules), and dexamethasone (4mg tablets/capsules). While these are the medications of choice for prevention and/or treatment of acute mountain sickness, high-altitude pulmonary edema, and high-altitude cerebral edema, recommended combinations and dosages may vary, depending on local treatment protocols. Many protocols can be followed with the aforementioned doses, but sometimes taking multiple tablets or half tablets may be required in order to do so. For the treatment of high-altitude pulmonary edema, an additional single sublingual nifedipine 10mg dose (to be taken together with the first extended release dose of nifedipine) may be added, but, while recommended by some,^{106,107} it is discouraged by others.¹⁰⁸

Vitamins and minerals

Vitamin and mineral supplements are not normally required for healthy, fit, well-fed men, but supplements from selected micronutrients may be beneficial when a well-balanced diet is not available or during sustained operations in extreme environments, especially in cold weather, at high altitude, or when diving (Table 1).¹⁰⁹ Since it is hard to find single tablets or capsules containing only the exact amounts of recom-

Recommended Daily Vitamin and Mineral Needs	
Prolonged physical stress in austere environments	
Vit. C:	minimum 200mg
Cold weather operations	
Vit. B1:	3mg
Vit. B2:	2mg
Vit. C:	250mg
Vit. E:	400 IU
Zn:	15-20mg
High-altitude operations	
Vit. C:	1000mg
Vit. E:	400 IU to be taken in divided doses in the morning and evening
Diving operations	
two hours before extended dives:	
Vit. C:	1000mg
Vit. E:	400 IU

Table 1: Recommended vitamin and mineral needs

mended vitamins and/or minerals, supplements may include other vitamins and/or minerals as well, provided neither iron nor copper are included,¹¹⁰ and tolerable upper intake levels (i.e. an estimate of the highest level of intake without appreciable risk of adverse health effects) are not exceeded.

Stimulants

Even if proper sleep management is always preferred to taking drugs, the use of alertness-enhancing drugs may be appropriate for the management of fatigue, when sleep loss is inevitable during sustained operations or in an evasion scenario.

Caffeine is a freely available substance which is effective in countering the detrimental performance effects of extended wakefulness.^{111,112} In spite of fears that caffeine may not work well when large amounts are consumed on a regular basis, the regular intake of caffeine (e.g. from coffee) seems not to reduce the effect of caffeine on performance.^{113,114} Caffeine can be found in a number of easy-to-carry products, including pills and gum.

Dextroamphetamine and modafinil are alertness-enhancing controlled medications that have been reported as effective.¹¹⁵⁻¹¹⁷

Cutting instrument

A cutting instrument will be required to cut dressings, bandages, and tape. Since a knife is normally carried as a universal utility tool in the field, and bandage scissors should be part of the individual major trauma kit, no additional cutting tools need to be carried as part of an in-use or survival medical kit. Surgical blades or razor blades are often included in the general packet of a survival kit, but while useful for some general survival tasks, are not specifically required for medical applications on oneself.

Needle

A sterile needle is useful to open blisters, so fluids can be squeezed out, while keeping most of the blister roof intact. This will minimize discomfort and may reduce the possibility of infection.¹¹⁸

Person-specific medical items

Personal prescription drugs, over-the-counter drugs, and any other medically related items may have to be added, as required by each individual. Examples include motion sickness medication, laxatives, and antacids, some of which are sometimes recommended for general, rather than for person-specific use, for specific environments or mission profiles.^{119,120}

Operators who are known to be allergic to insect bites/stings should carry an anaphylaxis kit,¹²¹ which could include an epinephrine auto-injector. (Figure 10)

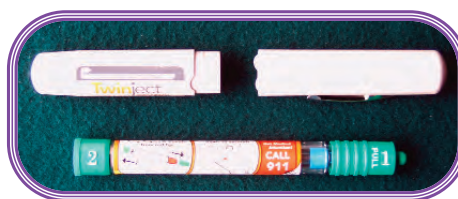


Figure 10:
Epinephrine
auto-injector

Individuals wearing contact lenses should carry rewetting solution.¹²²

PACKAGING

All items affected by water or moisture should be waterproofed. In a wet environment, it is highly recommended for moisture-sensitive items to be waterproofed separately, even if waterproof containers are used for the overall packing of kits.

Pills, tablets, capsules, and, depending on outer packing materials used, sharp items such as tweezers, can be carried inside small waterproof hard plastic tubes. High-density polyethylene (HDPE) tubes work well, but the right types or sizes are often difficult to find. (Figure 11) If required, cotton wool should be added to prevent rattling, not only to help maintain noise discipline, but also to avoid pulverization of pills or tablets. Often, medications packaged in this way take less space than when carried in their original blister packages.



Figure 11: Small waterproof HDPE tubes with dollar coin for size comparison

Repackaging fluids in small, durable, waterproof HDPE bottles with a screw cap, often provides a far more secure and compact option than using the original containers.¹²³ (Figure 12) Swab sticks are designed for single use only, yet are often bulky when packaged.



Figure 12: Waterproof HDPE bottles

A more sensible approach is to use either small single-use vials, or a small plastic bottle, combined with a few cotton-tip applicators. For fluids used to cleanse the intact skin, towelettes provide a compact option, but visual inspections of undamaged packages will not be possible, so regular replacement may be required to be sure they haven't dried out.

To store semi-solid lubricants, a small jar (with a capacity of about 20ml) takes less space than the containers they normally come in. (Figure 13)



Figure 13: Small jars



Figure 14: Waterproof containers

Foot powder can also be stored in a waterproof bottle, but care should be taken when using it, if no dispenser cap is available. Using a narrow-neck bottle (which will have to be filled with some type of funnel), will reduce the risk of spills.

Some products, such as tablets producing chloride dioxide, may have to be stored in their original vacuum package, in order not to be affected by air or moisture.

One of the most challenging tasks when building in-use and survival medical kits is to find lightweight and compact outer containers which

protect the contents from water, pressure, and puncture, yet allow easy and repeated access, and are small enough to fit into clothing pockets or load-bearing gear pouches. (Figure 14)

While there are many different waterproof first aid kits on the market, few have a suitable container as required for a military in-use or survival medical kit, or kit component:

- Non-waterproof rigid boxes, both plastic and metal, can be waterproofed using tape, but this will preclude easy and repeated access. Tape can be re-used in theory, but can rapidly become useless due to contact with dirt, etc.
- Waterproof semi-rigid plastic (e.g. polypropylene) containers rarely remain waterproof when under physical pressure, and may crack when exposed to extreme temperatures.
- Box-shaped waterproof rigid plastic (e.g. polycarbonate) containers are usually made from very thick materials, so apart from being relatively heavy, they have a conical shape, due to which the usable (inner) volume is disproportionately small compared to the overall (outside) volume.

- Bottle-shaped containers don't offer easy access to bottom-packed items, while a reasonably sized diameter to allow easy access would most often require too large a bottle.
- Soft (flexible) waterproof containers often come in too large of sizes, and many do not offer the abrasion/puncture resistance required for military field use. However, some may be suitable to pack in an in-use or survival medical kit or part thereof, especially those made from thick rubber, provided they are protected from punctures.
- Box-shaped metal containers with an integral rubber rim within the lid, to protect against water, rarely have the correct size to fit a medical kit, although the smaller types can be used to carry those components that require waterproofing. Positive pressure is usually required to keep the lid sealed, which can be maintained by metal locking roller clasps. Some metal containers are advertised as water-resistant, but are not able to keep out water even for a short while when submerged, so prior testing is highly recommended, to avoid surprises when in the field.

Medical items may make up approximately 50% of a survival kit,¹²⁴ both in terms of quantity and total volume of items carried, if only dedicated survival items are taken into account (excluding dual-use items required for routine field use). Whether these medical items are packed as part of a larger survival kit or as a separate kit, is largely a matter of personal choice. The second option offers several advantages: It avoids having too bulky a survival kit, especially if a comprehensive range of medical items is included, it allows the general part of a survival kit to be permanently sealed, and depending on

the load-carrying gear used, it may be easier to pack two small containers than one larger, although their combined volume will invariably be larger. As a general guide, a survival medical kit should normally be small enough to be stored inside an A6-size bag. (Figures 15, 16)

Mixing in-use or survival medical kit contents with items from



Figure 15 and 16: *Survival medical kits*



an individual major trauma kit, on the other hand, is not recommended, as both are designed for totally different situations.

Packing will also be guided by how a kit is organized and where a kit or kit component is carried (see below).

KIT BREAKDOWN AND CARRYING LOCATIONS

A survival medical kit should be carried on the body. The preferred location is probably inside a combat jacket's lower pocket, where it doesn't interfere with



Figure 17: *Lower smock pocket able to carry survival medical kit and part of in-use medical kit*

load-carrying gear or body armor, which is feasible in temperate and cold climates. (Figure 17) In freezing conditions, it may well be necessary to wear it in the inside pocket of a jacket if possible, using body heat to prevent contents

from freezing. In hot conditions, it will probably be necessary to dedicate some precious packing space inside a belt, chest rig, or load-bearing vest pouch, as jungle and



Figure 18: (Above) *Survival medical kit & part of in-use medical kit carried in chest rig pouch*

Figure 19: (Below) *Survival medical kit & part of in-use medical kit carried in assault vest pouch*

desert shirts usually have no suitable large pockets. (Figures 18, 19) An alternate location might be inside a so-called "go-bag" or "bug-out bag," or any similar bag, small rucksack, or pouch intended to carry essential equipment in an evasion scenario. (Figure 20)

An in-use medical kit, less those items required also for survival use (see below), can be carried at whatever location is most suitable, and may be split





Figure 20: *Survival medical kit & part of in-use medical kit with examples of pouches and bags to carry them.*

into several components, depending on size and the context in which its items are expected to be used. (Figure 21) Rucksacks may be the most appropriate location (Figure 22), especially to carry those items that are too large to be carried inside uniform pockets or assault vest pouches, such as a complete foot care kit. A comprehensive foot care kit, although having utility in many survival situations as well, may be most useful; however, when carrying heavy loads (it might be best carried with that load, i.e. inside a rucksack), while a survival kit would typically contain less bulky yet essential foot care items anyway.

In order to avoid unnecessary duplication, some medical items required in a survival medical kit, but also required in other than survival situations, might be carried only as part of an in-use medical kit. (Figure 23) These include reusable instruments and consumable medical supplies that are periodically required in very



Figure 21: *In-use medical kit - part 1 (items not required for survival use)*

Figure 22: *Possible location to carry part of the in-use medical kit. Those items required also for survival use should be carried with the survival medical kit*



small quantities, such as malaria prophylaxis. Sufficient supplies should then be included to cover a reasonably long period beyond the planned mission duration, and these items may have to be packed separately from other in-use medical kit items and carried on the body, just



Figure 23: *In-use medical kit - part 2 (items also required for survival use)*

like a survival medical kit, and will become part of it in a survival situation. The principle, an in-use individual medical pack becoming a Soldier's survival medical pack, in case he is cut-off from his unit, has been documented in military handbooks for decades.¹²⁵⁻¹²⁷ For consumable items that are bulky and repeated use is anticipated, regardless of the situation, a supply split between the in-use and the survival medical kit might be the preferred option.

As always, the tactical situation should be taken into consideration. If, for instance, the evasion plan for an operation in a mountainous environment calls for an immediate descent, it will most likely not be useful for cut-off individuals to have high-altitude medications on the body.

It should also be remembered that in a survival situation, medical supplies from an individual's major trauma kit may be used for other than their intended purpose. An example would be gauze, which could also be used to scrub or dress outdoor wounds, minimizing – or maybe even eliminating – the amount that needs to be included in a survival medical kit.

MARKING AND DOCUMENTATION

Tubes should be marked with water-resistant labels stating the contents, expiration dates, and directions for use. One method to protect the labels from moisture is to place them inside the tubes, but their visibility will be reduced when using opaque tubes.

Waterproofed sheets containing an inventory, and possibly more detailed instructions on the use of selected components, will provide an overview of what's carried and will also facilitate more rapid kit preparation and periodic inspections.

For medical kits carried across borders during deployments, the requirement for appropriate documents for controlled drugs and for other prescription-only medicine may have to be considered,¹²⁸ especially when using commercial transportation systems.

This article was intended to give some insights as to why some items might be included as part of an in-use SOF survival medical kit. It should be remembered that kit contents should always be adapted to the mission, the environment, and the individual. Only a properly packed and configured kit, carried in a suitable location, will make it truly useful, provided adequate training has been conducted prior to mission execution.

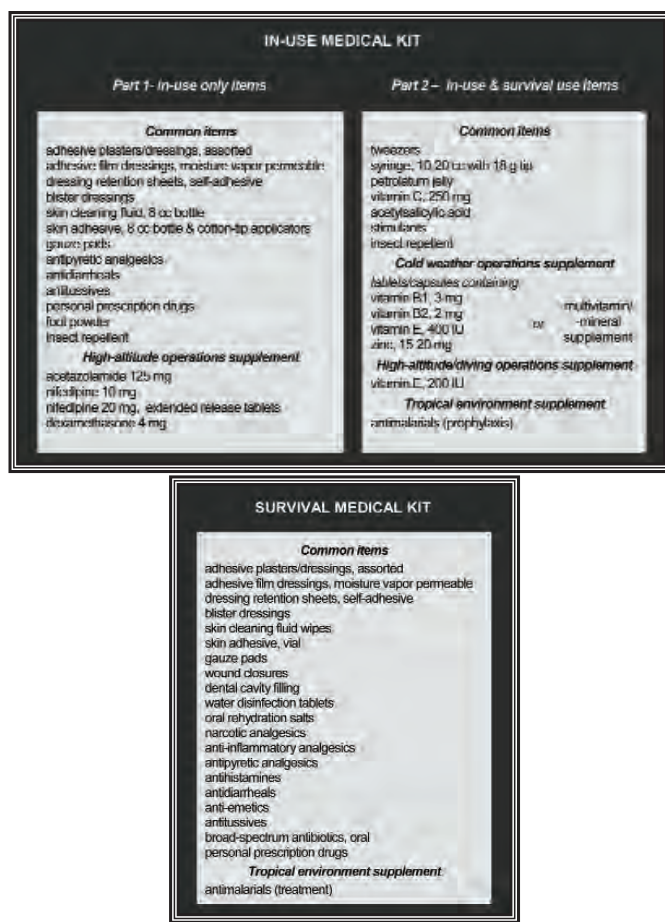


Table 2: Sample survival medical kit and in-use medical kit contents

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Medical Seminars: A New Paradigm for SOF Counterinsurgency Medical Programs

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ABSTRACT

Medical programs are valuable tools when they properly align with operational objectives. In counterinsurgency operations, the medical program should promote the capacity of the host nation government and lead to greater self-sufficiency. The Medical Civic Action Program (MEDCAP) often fails to fully integrate host nation providers and officials which may undermine local medical infrastructure and rarely provides sustainable improvement. The Medical Seminar (MEDSEM) was developed during Operation Enduring Freedom-Philippines to address the shortcomings of the traditional MEDCAP. The MEDSEM greatly enhanced the MEDCAP by adding education to the venue, thereby promoting self reliance and improving the sustainability of medical interventions. Furthermore, the MEDSEM forged relationships and promoted interoperability through collaboration between local medical providers, governmental leaders, host nation forces, and U.S. Special Operations Forces.

INTRODUCTION

Medical programs are but another tool available to Special Operation Forces (SOF) commanders to influence an operationally important geographical area or population. The MEDCAP has long been utilized to deliver medical services to areas of interest during peacetime and wartime operations. These programs have been known by a variety of titles throughout the last century, but the primary concept has remained constant: Providing medical services to achieve an operational end-state.

The role of medical staff is to successfully bridge the gap between the commander's intent and end-state with solid medical planning and sound medical practices. Often, the traditional MEDCAP provides little more than short-lived, non-sustained effects. This is key to understanding the fundamental inadequacies of traditional MEDCAPs conducted in long-term support of counterinsurgency (COIN) operations. All operations conducted in support of COIN should be as progressive as possible, promoting the capacity of the host nation (HN) and eventually lead to greater self-sufficiency. A single-day event with insufficient planning and inadequate follow-up produces few positive effects and does not build enduring capacity.

Traditional MEDCAPs can counteract COIN objectives by creating unachievable expectations without attending to basic health needs. Addressing basic needs is the first step toward building medical self-sufficiency. Furthermore, traditional MEDCAPs often fail to fully integrate HN health officials into the event. Treatment is then credited to the visiting force's providers, while local providers are perceived as infe-

rior. This degrades public confidence in its government's ability to provide essential services, ultimately undermining HN medical infrastructure. This article will outline our understanding and observations of traditional MEDCAP operations. Our assessment is the cumulative outcome of SOF experiences in Somalia, Haiti, Iraq, and Southeast Asia. We will then present a comprehensive model that was used to address MEDCAP shortcomings during Operation Enduring Freedom-Philippines (OEF-P).

IDEAL MEDICAL PROGRAMS

All military medical engagements should align with operational objectives. In practice, the ideal medical program fully integrates HN medical assets, enhances information sharing by promoting interoperability, and addresses the health needs of the targeted population. The first two are the means to the end. Host nation health officials should be at the forefront at all times. This accomplishes two important functions. First, it connects those doctors, nurses, midwives, informally-trained persons, or government officials with their patient population. They are responsible for the health of their citizens and the people should perceive them as such. Second, information sharing and interoperability increase as those providers coordinate with other medical officials, local governments, non-governmental organizations, and security personnel. The first steps to improving public health and starting on the road to self-sufficiency are the identification of needs and collaborative pooling of information and assets.

From a public health perspective, coordinated planning and continued progression are the most important aspects of improvement. This will have a much greater impact on long term public health than any single intervention. Providing direct care results in only temporary relief of the medical situation and contributes little or nothing to long-term improvement in the health system. The emphasis should be on developing capability over providing direct service.¹ However, from the patient's view, the direct delivery of medical care is the tangible validation of impending improvement. This cannot be dismissed. Population confidence in their medical system must be established in order to bolster immediate HN support and facilitate progress.

A patient will place his/her trust (or allegiance) in the person or group that is capable of delivering direct care, regardless of long term implications. Altruistic U.S. medical providers may overshadow local providers in their eagerness to help by providing care. In Vietnam, some observers held that this practice was counterproductive by diminishing confidence in the government's ability to meet population needs.² Caution must be exercised to ensure that the main effort is directed at improving the HN provider's ability to care for his/her countrymen. Operations in support of COIN should regain control of population centers and favorably influence perceptions of HN legitimacy and capabilities.³

Medical care delivered at all medical engagements must also be sound. Standards of care do not stop at the borders of undeveloped nations. Treatment should be appropriate to the disease process. Limitations should be placed on interventions based on a provider's level of training, availability of follow-up, and access to medications. Every patient does not require medication and adverse reaction rates are similar throughout the world. However, unlike the rest of the world, an adverse effect from an unneeded treatment could be amplified and exploited by the insurgency.

TRADITIONAL MEDICAL CIVIC ACTION PROGRAMS

Over the past six decades, MEDCAP operations have grown to be the leading medical engagement employed by commanders. The MEDCAP truly earned its name during the Vietnam War even though the concept dates back to our American Civil War with the Freedmen's Act of 1865.⁴ The Union Army was tasked to provide medical services, as well as food and clothing, to former slaves and freedmen. The inception of using medical services as a policy tool started after the Spanish American War in Cuba and continued during the Filipino Insurrection.⁵ The Pacification Policy was instituted in the Philippines to win over the civilian population, and deprive guerrillas of their support base.⁶

During the Vietnam War, MEDCAPs were used for strategic purposes: to win "the hearts and minds" of the people.⁷ The U.S. military invested between \$500

million and \$750 million in MEDCAPs and treated more than forty million Vietnamese civilians.⁸ Since the 1960s numerous MEDCAPs have been conducted throughout the world to include the horn of Africa, Asia, Central and South America, Haiti, and the Middle East.

The traditional MEDCAP is typically a single-day event that provides medical or dental care and can vary in size from a few hundred patients to a few thousand. The operation is divided into three distinct phases: planning, execution, and follow-up. The planning phase identifies the MEDCAP location, integrates medical and security assets, and ends with meeting and coordinating with leaders of the area of interest. The execution phase consists of movement to the location, establishment of security, completion of medical treatment, and movement back to home base. Medical treatment usually begins in the early morning and continues until late afternoon or medical supplies are depleted. The follow-up phase is critical as it reengages that population to ensure achieved gains are maintained and available to build upon during future operations.

MEDCAP SHORTCOMINGS

Comprehensive and inclusive planning is critical to area preparation and asset development. Within some operations, MEDCAPs are planned and executed at paces unsuitable to relationship and capacity building. Execution of a MEDCAP is often seen as the main effort as opposed to area preparation and follow-up operations. The patient-provider interaction is just as hurried (average of three to five minutes per patient). Time is limited to quick diagnosis and treatment with no time for patient education.

Host Nation providers are typically an afterthought and MEDCAP teams regularly execute with 70% U.S. and 30% HN personnel. Capacity is not enhanced, HN providers are marginalized, and the medical infrastructure is not reinforced by this type of program. In Iraq for example, JB Baker describes the undermining of local medical services sanctioned by the Iraqi Ministry of Health and provincial medical directors, decreasing support for Iraq's national and provincial governments.⁹

Success is routinely measured by the quantity of patients seen instead of the quality of care.¹⁰ The focus is generally only short term. As word spreads, population demand increases. This short term focus can raise expectations and cause dissatisfaction with local medical resources.¹¹ Often, contacted populations grow skeptical of both U.S. and HN care as a result. Further dissatisfaction results from inadequate follow-up engagements. Any ground gained is tied to the half-life of the dispensed medications which may lead to the loss of patients, contacts, and population/geographical gains. This is not aligned with SOF's need to establish and maintain rapport with a given population.

The average MEDCAP supply pallet contains antimicrobials, analgesics, topical corticosteroids, and multivitamins, yet the majority of patients present with common complaints requiring little or no medical interventions. Most of those patients are mothers looking for something to put in the “medicine cabinet” for their children, much like mothers in the U.S. A smaller percentage of patients require a slightly higher level of intervention, such as antibiotics or anti-parasitic medication. A small percentage of patients have illnesses that require significant intervention and/or follow-up, such as hypertension, renal disease, or surgical conditions. These patients are beyond the scope of practice for any short-term medical engagement. The key is to avoid creating false hope and/or dispensing unneeded treatment.

The distribution of patients seen at MEDCAPs is not that dissimilar to your average U.S. family medicine clinic. A significant proportion of patients do not require medications and a small proportion of them require advanced treatment. Avoiding unneeded medical treatment is a hallmark of good medicine. Another hallmark of good medicine is patient education. When specific interventions are not required, education leads to sustainable improvement in overall health. Good patient education is Western medical standard of care. That same level of care can be practiced in undeveloped nations, allowing the provider to remain true to his/her patients and ensure mission success without exposing SOF to negative information operations (IO) from adverse outcomes.

MEDICAL SEMINARS

The MEDSEM was created to address the shortcomings of MEDCAPs during counterinsurgency operations on the island of Mindanao in the Southern Philippines. At its core, the MEDSEM is a type of military medical civic action program. However, identifying this unique version as a MEDCAP proved to be confusing and hampered progress during early planning. Therefore, the venue was renamed in order to emphasize the differences between it and traditional MEDCAPs. The MEDSEM was designed to engage an area of interest, deliver sound medical care, foster relationship building, enhance local medical infrastructure, and promote interoperability between HN agencies.

Planning began with detailed analysis of the battle space. The Special Operations Task Force (SOTF) medical staff worked closely with HN military operational planners. Analysis was conducted by a physician, a physician assistant, or a Special Forces Medical Sergeant. Medical staff responsibilities included identifying regional and provincial medical assets, providing assessments of area medical needs, and developing feasibility assessments for various operations. The location of a MEDSEM was either top-

down driven from the SOTF or bottom-up driven from the Operational Detachment-Alpha (ODA). In the end, 10 to 15 barangays (villages) of operational importance were identified for a MEDSEM by SOF and HN planners. These barangays typically spanned a 10 to 20 square-mile area.

Medical asset development was required at all levels. The SOTF medical staff forged relationships with regional and municipal health offices, HN medical officers, and area hospitals. The ODA medics did the same with rural health workers, and local HN military, government, and police. These steps were crucial. It involved HN infrastructure from the very beginning and identified public health needs from their perspective. Furthermore, it initiated the vital process of promoting interoperability between the various organizations (medical, governmental, law enforcement, and military). The SOTF and ODAs hosted meetings that facilitated information sharing and event planning. The initial meeting outlined the MEDSEM, proposed a timeline and identified roles. Host nation medical officials remained in the forefront at all times. An average of three planning meetings was required over a two to four week period to solidify relationships and adequately synchronize operations.

Table 1: MEDSEM Outline
<u>PLANNING (Relationship Building/Area Prep)</u>
Identify location of MEDSEM
Identify host nation medical assets
Conduct planning meetings
Send invitations to areas of interest
Meet with area leaders
<u>EXECUTION (Access/Host Nation Promotion)</u>
Opening day ceremonies
Three days of classroom instruction
Graduation, Medical Programs
<u>FOLLOW-UP (Sustainment)</u>
Continue communication with all assets
Follow-up Engagement

Table 1 outlines a MEDSEM. Following the first planning meetings, the HN military would establish initial contact with the barangays and present a formal invitation for three students to attend a MEDSEM. Medical experience was not required. Barangay leaders were given a brief overview of the seminar and subsequent medical programs to be conducted at their barangays. The responses from all MEDSEMs were immensely positive and every invited barangay participated, regardless of the level of insurgent influence.

All entities contributed to the success of a MEDSEM. Municipal health offices identified public health needs, generated lectures, and served as primary instructors and care providers. Local governments typically hosted the three-day seminar at town halls or city centers. At two seminars, the local mayors provided daily lunches and snacks for the students during the seminar. The HN military was responsible for care providers and outer-perimeter security. Host nation police were responsible for crowd control and inner perimeter security. Local public and private healthcare providers often volunteered to deliver care and serve as assistant instructors. Individual barangays were responsible for student transportation. They would typically pool what little money they had (\$2.00/student). The amount of cooperation was staggering and directly responsible for mission success.

A formal opening ceremony initiated all MEDSEMs. These ceremonies were attended by local dignitaries, religious leaders, and HN civilians. The local government and HN military coordinated for press coverage during the ceremony, seminar, and medical programs in order to maximize positive IO effects. Following the opening ceremony, students underwent a short in-processing that consisted of turning in their application with name, barangay, and contact information. All students were issued a textbook that contained all lectures.

Classroom instruction began immediately following inprocessing and continued for three days. Our MEDSEMs focused on basic women's and children's healthcare topics. They were taught by municipal nurses and midwives in the local language (Tagalog).

Table 2: Example MEDSEM Curriculum
<u>MEDSEM Curriculum</u>
Filariasis
Malaria
Dengue Fever
Tuberculosis
Hansen's Disease
Measles
Animal Bites and Rabies
Common Childhood Infections
Childhood Emergencies
Immunizations
Malnutrition and Vitamin Deficiency
Family Planning
Maternal Medical Care
Breastfeeding
Obstetrical Emergencies
Wound Care
Avian Influenza
Cervical and Breast Cancer Awareness
Medical Reporting
Medical Programs

An example curriculum is listed in Table 2. These topics were directed at the layperson. The municipal health workers emphasized public health awareness and developed the students for medical surveillance and reporting.

The last class taught at a seminar was Medical Program Preparation. Students received instruction on preparing and hosting a medical program at their barangays. Essentially, these engagements were short municipal health workers and student-lead MEDCAPs, but this title was avoided to prevent confusion once again. This class prepared students for medical programs following the seminar and developed assets for future engagements. The final class was followed by a formal graduation ceremony where students received a graduation certificates and class photo (see Figure 1). The graduation photo was immensely popular with all students at all MEDSEMs.



Figure 1: MEDSEM Graduation Photo

All students were responsible for conducting a medical program at their barangay on one of two days following the classroom instruction. This was their "final exam." Host nation medical care and security teams were used for all programs. Host nation military and ODA members conducted key leader engagements and area assessments. Prior to the medical team's arrival, the students would register patients (typically between 200 to 400 patients) and deliver one of their recently learned preventive medicine lectures. Students then identified up to 50 patients to be seen by HN providers while they, under the supervision of HN nurses and midwives, delivered individual education and dispensed over-the-counter medications (See Figure 2). Follow-up engagements were scheduled and executed for 90 to 180 days following the MEDSEM. These events typically consisted of small medical engagements run by MEDSEM graduates.

MEDSEM RESULTS

A typical MEDSEM trained 40 to 50 students/medical contacts in three days and treated 2500 to 4000 patients in 10 to 15 separate barangays. Relationships were formed between graduates, medical providers, governmental officials, military, and security entities. The cost of a MEDSEM averaged



Figure 2: MEDSEM graduates provide education and dispense over-the-counter medications under supervision of HN providers.

\$2.50/patient. Compare the above with traditional one day OEF-P MEDCAPs that treat 500 to 1000 patients with an average cost of \$5.00/patient. The significant difference in costs reflects the decrease in prescription medications on MEDSEM pallets. Benefit analysis of continued relationships with an area of interest is difficult to quantify, but positive impacts on operational objectives, intelligence, and sphere of influence are obvious. Measures of performance for a MEDSEM are listed in Table 3. There were no adverse outcomes and no effective negative information operations from the insurgency.

DISCUSSION

The MEDSEM is one variation that addresses the inadequacies of traditional MEDCAPs. It aims toward improvement and highlights the essential elements of an effective operation that is aligned with COIN objectives. All MEDSEMs conducted in support of OEF-P were very successful. Measures of effectiveness for a single MEDSEM are listed in Table 4.

There will still be times when a traditional MEDCAP might be employed. Time constraints, limited population access, enemy activity, and security may dictate a smaller, single day event. For example, a small, “tailgate” MEDCAP may be utilized to make initial contact with an isolated population center. Additionally, larger MEDCAPs that provide definitive treatment such as surgical procedures or ophthalmic interventions may provide invaluable care to underserved populations. However, these large MEDCAPs require extensive resources and manpower that are supplied predominately by visiting forces. These engagements may better serve humanitarian operations, which is beyond the scope of this article. Regardless of the variant of MEDCAP, the operation will be successful if planners recognize and avoid past pitfalls. Planning considerations should include the advancement of HN medical infrastructure, promotion of interoperability, and genuine improvement of public health. These are exceptionally important to long term efforts.

Host nation medical assets may be insufficient or even non-existent in some undeveloped nations.

This does not change the fundamental requirements of good medical operations. It only changes the starting point from which capacity building begins. Special Operations Forces must be masters of force multiplication and training. Developing medical assets is no different. This is a role tailor-made for the Special Forces Medical Sergeant. In these environments medical infrastructure enhancement is a grassroots operation with ODAs developing assets and improving public health (and subsequent security) within their areas of responsibility. Those

Table 3: MEDSEM Measures of Performance		
Categories	Measures	
# Barangays Invited	17	
# Barangays Engaged	17 (100%)	
Agencies or Political Groups Involved in Planning	Local Government, Local Health Officials, Local Police, HN Military, NGOs, U.S.	
Agencies or Political Groups Remained Until Completion of Event	Local Government, Local Health Officials, Local Police, HN Military, NGOs, U.S. (100%)	
# Students Trained	51	
# Patients Treated	4,413	
% Patients Treated by U.S. vs Host Nation	US: 20%	
	Host Nation: 80%	
Cost Sharing	Personnel	U.S.: 12; HN Government/Police: 80; HN Military: 45; Participating Locations: 204
	Materials	U.S.: 2 x medication pallets (~\$10,000)
		Local Govt: Opening Ceremony, Lecture Hall, Daily lunches for students (\$500)
		Participating Locations: Student transportation costs, food for visiting medical teams (\$100)

Table 4: MEDSEM Measures of Effectiveness	
Categories	Measures
Capacity to Govern	
Municipal leadership strengthened by hosting event	<ul style="list-style-type: none"> • Local government viewed as responsible for hosting event • Local officials view interaction with its constituents as positive
Security	
HN military and police capacity within areas of interest increased	<ul style="list-style-type: none"> • HN military and police viewed as responsible for executing event • Military and police operations enhanced in areas of interest • Hostilities are decreased or non-existent
Access	
Access obtained into barangays of interest and future access granted by local leadership	<ul style="list-style-type: none"> • Access obtained into all barangays of interest • Barangay leadership supportive of future engagements • Possible venues identified for future engagements
Interoperability	
Cooperation and info sharing fostered between participating groups	<ul style="list-style-type: none"> • Local government, HN military and police operations synched • Communication facilitated between leaders and government • All medical personnel share info/ideas
Focused Engagement	
Areas of interest primarily engaged	<ul style="list-style-type: none"> • Engagement reaches target audience • Main effort delivered in area of interest
Medical	
Meaningful and sustainable improvements in current and future health of barangays	<ul style="list-style-type: none"> • Graduates share knowledge with their barangays • Graduates coordinate and execute and effective MEDCAP • Graduates continue to be asset for future engagements • Barangays learned how to access care through HN
Information Operations	
MEDSEM portrayed in positive light to broad population	<ul style="list-style-type: none"> • Positive message delivered to population outside of engaged area • Press attended MEDSEM event • No negative or adverse events

assets can later be connected to others at operational and strategic levels of development. This would establish the rudimentary framework for emerging medical infrastructure.

The MEDSEM was a model used to address our observed inadequacies of the traditional MEDCAP within OEF-P. This specific model may not apply to all situations. However, the presented principles of successful medical operations conducted in support of COIN should always apply. Unlike most conventional forces, SOF success is intricately tied to the population. In many situations, survival depends on this relationship. They are tied to the people and the people are the center of gravity for mission success. Methodic, well planned, progressive operations that build HN capacity are the path to self-sufficiency and ultimate victory over insurgents. Medical operations are no exception. Effective engagements build upon past successes, enhance HN medical infrastructure, increase interoperability between local assets, and instill national confidence within the

population. Special Operations Forces medical personnel possess the training and ability to incorporate those principles into medical operations aligned with COIN objectives.

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Evidence-Based Diagnosis and Management of mTBI in Forward Deployed Settings: The Genesis of the USASOC Neurocognitive Testing and Post-Injury Evaluation and Treatment Program

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CASE REPORT

A 28 year old 18-series Soldier was the driver in a vehicle which struck an improvised explosive device (IED). The vehicle was destroyed and the other occupant in the vehicle was killed instantly. The Soldier recalled hitting the roof of the vehicle at least once; however, he suffered no life-threatening injuries and was not initially evacuated to higher medical care. Immediately following the event the Soldier noticed a headache, mild dizziness, nausea, and short-term memory loss. Upon return to the forward operating base (FOB), he was evaluated by the forward surgical team physician who performed a military acute concussion exam (MACE). His score was 24 out of 30 and he was diagnosed with a mild concussion, his symptoms were treated with acetaminophen, and he was released.

On day three, he participated in another combat patrol. During the operation he suffered from dizziness and headaches. He self-medicated with acetaminophen and meclizine transdermal for his symptoms. On this patrol, he was exposed to overpressure from explosions on two separate events. Each explosion was the equivalent of approximately 27 pounds of TNT (trinitrotoluene). Following this mission, he returned to his FOB and noticed increased dizziness, nausea, and memory loss. No other members of his team who were exposed to those two explosions reported any symptoms. He continued to self-medicate with acetaminophen and meclizine transdermal. He did not seek follow-up medical care. Later that same day, he participated in a third mission as part of a quick reaction force which included a high altitude helicopter assault. He was not exposed to any additional blast or injuries.

After returning from the third mission, the patient experienced significant fatigue. He went to sleep and later the same night experienced loss of consciousness after quickly standing from a lying position. Upon recovering consciousness, he experienced increased dizziness, nausea, and emesis. He was evaluated by the unit medical provider and evacuated to a Level III Theater Hospital.

Over the next three days, his nausea and dizziness improved; however, he continued to have significant issues with short term memory loss, difficulty concentrating, short-term memory recall, and headaches. His MACE scores slowly improved to 27 out of 30 over several days. He was evacuated through Landstuhl Regional Medical Center to the United States for additional evaluation and treatment.

INTRODUCTION

In the last eight years of conflict, U.S. military personnel have been exposed to a significant risk of head injury from the tactics, techniques, and procedures of our enemies. In 2007, the Defense Veterans Brain Injury Center (DVBIC) estimated that a minimum of 2,700 U.S. servicemembers suffered a traumatic brain injury (TBI). The number is not completely accurate as surveys of combat forces with at least a four-month tour of duty in Operation Iraqi Freedom (OIF)/Operation enduring Freedom (OEF) show that 30% of respondents suffered a mild TBI (mTBI) as a result of a blast wave.¹

This has resulted in mTBI being one of the “signature wounds” of the current conflicts in Iraq and Afghanistan.

The diagnosis and management of severe head injuries, to include subdural and epidural hemorrhages, open and closed skull fractures, and diffuse axonal injuries, has not been subject to the controversy surrounding the “milder” concussive injuries that have been put into the category of mTBI. The Centers for Disease Control and Prevention (CDC) defines a mTBI or a concussion as a complex pathophysiologic process affecting the brain, induced by traumatic biomechanical forces sec-

ondary to direct or indirect forces to the head, and is typically associated with normal structural neuroimaging findings.² For the purposes of this review, the terms mTBI and concussion are used interchangeably and are defined as physiologic changes in brain functioning resulting from trauma to the head or body without radiographic evidence, such as a computerized tomography (CT) scan or magnetic resonance imaging (MRI), of structural damage.

The neurometabolic cascade that can accompany these injuries has been well described in the Fall 2009 issue of the *Journal of Special Operations Medicine* by Delellis, Kane, and Katz. Understanding the pathophysiology on the cellular level is critical to the understanding, diagnosis, and treatment of mTBI as it is more of a metabolic injury than a structural injury.³ The focus of this review is to explore relevant published research from the sports community and its application to the development of a program for the U.S. Army Special Operations Command (USASOC). The overarching goal of the USASOC program is to give forward deployed providers the tools to effectively diagnose and treat mTBI, while simultaneously protecting the individual Soldier from more permanent and severe injury and protecting the unit by not allowing a Soldier to return-to-duty when not 100% ready to do their job.

The specific goals are to improve the diagnosis and management of mTBI using the latest current research from the sports medicine community. The treatment of mTBI is relatively simple, centering on physical and cognitive rest and protection from further exposure until all symptoms have resolved. Therefore, improving the provider's ability to make an early and timely diagnosis as well as educating the force and the chain of command are imperative to proper treatment. Trauma during the period in which the brain is still recovering from an initial injury can result in the devastating and fatal consequences of second-impact syndrome (SIS).⁴ Second-impact syndrome, although not that common in a military-aged population, is the most dramatic consequence of improperly treating a mTBI. Improper treatment of mTBI and return-to-duty before full recovery can result in or aggravate other significant long-term health complications, such as post-traumatic stress syndrome/disorder (PTSS/PTSD), post-concussive syndrome, and depression, as well as lengthening the recovery time from subsequent concussive head injuries.^{5,6} The end-state of the treatment within the USASOC program will be for the asymptomatic Soldier to participate in a graded program of increasing physical and cognitive exertion. Upon successful completion of the program the Soldier may be returned to duty. In the above case, the Soldier clearly had not completely recovered from his first injury when he was exposed to two more blasts and the end result was that he was evacuated out of theater. In addition, the discussion below will highlight the fact

that "less is more" when treating mTBI. High levels of exertion by "pushing through it" or "sucking it up" while still symptomatic in the post-concussive period can prolong the patient's recovery and potentially lead to the development of chronic symptoms.

DIAGNOSIS

The diagnosis of mTBI is a challenging clinical diagnosis and must be approached using all the tools available, including a thorough history, a focused physical exam, and a neurocognitive assessment. The history of the traumatic event must be fully explored to determine the potential for causing brain injury, as should be the symptoms that the Soldier experienced immediately post-injury and is experiencing at the time of evaluation. The physical exam should include not only looking for evidence of head injury, such as trauma above the clavicles, but should also include a neurological examination focusing on the vestibular and postural stability systems. Finally, a neurocognitive assessment should be used to evaluate neurocognitive performance. No one tool is perfect for the diagnosis of mTBI, and the clinical decisions made by medical providers should involve an assessment of all three areas.

HISTORY

The history of the injury has been considered extremely important in the initial evaluation of the Soldier. Attempts have been made to specifically define what injury history requires an evaluation. Such criteria as being near an explosion (within "x" meters) or being in a vehicle hit by an IED are starting points, but research has shown that there are no specific thresholds for injury. In a prospective study using accelerometers in the helmets of 88 National Collegiate Athletic Association (NCAA) football players, all head impacts over the course of the 2004 – 2006 football seasons were recorded. In the 88 players, 13 concussions were documented. Comparing clinical measures (baseline and post-injury changes) to the linear and rotational accelerations of the head revealed no significant relationships between the magnitude, direction (linear or rotational), or impact location, and symptom severity, postural stability, and neurocognitive function. The authors reached the following conclusion: "Our findings suggest that football players are concussed by impacts to the head that occur at a wide range of magnitudes and that clinical measures of acute symptoms severity, postural stability, and neuropsychological function all appear to be independent of impact magnitude and location."⁷ Based on this study, establishing a threshold for concussive injury may not be as clear cut as being in specific proximity to an IED explosion, and medical providers should not minimize reported exposures that seem "too small" to cause injury. In an effort to provide some guidance for the de-

ployed provider the DVBIC is in the progress of publishing incident based screening guidance. The intent of this guidance is to lower the screening threshold and maximize the number of servicemembers screened to minimize the number of servicemembers who suffer an undiagnosed mTBI. The guidelines will state that anyone in a damaged vehicle, dismounted personnel within 50 meters of a blast, within a structure hit by an explosive device, anyone who sustains a blow to the head, or who is command directed should be evaluated with at least a MACE examination and then managed appropriately based on the results.⁸ Guidelines should never supersede clinical judgment and, keeping in consideration that injury severity is not directly related to the impact magnitude and location, providers should maintain an index of suspicion for mTBI when conducting post-incident evaluations.

Symptom history has also been considered an important part of the initial evaluation of the Soldier, but it should be noted that the absence of symptoms does not mean that no injury has been sustained. A study that evaluated the symptoms of concussed athletes and their neurocognitive performance revealed that asymptomatic concussed athletes performed more poorly in neurocognitive testing 48 hours post-injury than did matched control subjects. Of note, the group of symptomatic concussed athletes had significantly poorer performance on neurocognitive testing than did the asymptomatic concussed athletes.⁹ The results of this study show that the absence of symptoms 48 hours post-injury are not indicative of full recovery, but should be considered in the context of a full evaluation (history, physical exam, and neurocognitive assessment). Though one must consider the caveat that many Soldiers and athletes will under-report or minimize symptoms in order to stay in the “fight” or “game,” some symptoms have been shown to be a discriminator as to the severity of the injury. The presence of and duration of loss of consciousness (LOC) is often a focus of providers when gathering the patients’ history, as it is felt to be a prognostic indicator of the severity of the injury. Research has shown that it is the amount and extent of amnesia (retrograde or anterograde) is a much better predictor of the severity of injury and not LOC.¹⁰ Another study looking at symptoms found significant relationships between “feeling foggy” one week post-concussion and persistence of other post-concussive symptoms as well as performance on neurocognitive testing. The study showed that regardless of the degree of fogginess on a 6-point scale, athletes experienced a larger number of post-concussive symptoms and significantly slower reaction times, reduced memory performance, and slower processing speed than those athletes that reported no fogginess.¹¹ These studies indicate a complex relationship between symptoms and injury. On one hand, the absence of symptoms at 48 hours is not indicative of full recovery, and

on the other hand, the presence of a specific symptom (amnesia or fogginess) can indicate a more severe injury.

PHYSICAL EXAM

The physical exam is also an important aspect of the comprehensive evaluation of a Soldier with suspected mTBI and should include assessments of the vestibular system and postural stability. Traditional focus has been on looking for evidence of trauma above the clavicles, such as bruising, lacerations, skull or facial deformities, and ruptured tympanic membranes. These injuries need to be addressed in addition to the potential for mTBI, but another focus of the exam should be the function of the neurologic system, particularly the balance and vestibular systems. Research has shown that in addition to symptom severity and neurocognitive function, postural stability is often affected initially post concussion. It has been shown that in addition to the standard Romberg test, the Balance Error Scoring System (BESS) is a useful adjunct in the evaluation of the motor domain of the neurocognitive system. Evaluation of athletes post-concussion has shown that the greatest deficits are apparent on post-injury day one, and resolution of these deficits should also be considered in any return-to-play (return-to-duty in our population) decisions.¹² It has also been shown that postural stability may not be affected in every case of head injury, nor does it appear to be related to the severity of post-injury symptoms or deficits in neurocognitive function.¹³ This is an important aspect of the physical exam for the evaluation of the post-injury Soldier, because many of the tasks that USASOC Soldiers do in combat require postural stability and a fully functioning vestibular system to be conducted effectively. Close-quarter battle (CQB) and the piloting of Special Operations aviation aircraft are two tasks that can be seriously hindered by deficits in these body systems.

NEUROCOGNITIVE TESTING

Neurocognitive testing is the final leg of the evaluation triad, and is important for multiple reasons. Neurocognitive testing can serve as a screening test for injury, as an assessment tool during follow-up care, and an indicator of physiologic brain function. As discussed earlier, neurocognitive deficits can be present post injury even in the absence of symptoms.¹⁴ The MACE is a military version of the standardized assessment of concussion (SAC) which has been shown to be useful in the initial screening of athletes suspected of head injury. Studies of the SAC have shown that concussed athletes score significantly below non-concussed controls, and that follow-up testing can document a return to pre-injury baseline within 48 hours of the injury. Clearly the MACE or the SAC is effective in the initial evaluation; however, for serial testing and documentation, its limitations become apparent. A 1998 study of the SAC by McCrea and colleagues showed 100% return to baseline

within 48 hours, while a 2006 study by Van Kampen showed that with more sensitive neurocognitive testing, 83% of concussed athletes continued to demonstrate neurocognitive deficits 48 hours after injury.^{15, 16} Granted, these are different studies, with different patient populations, but they suggest that either the SAC is not sensitive enough to pick up residual neurologic deficits, or there is a significant practice effect involved.

In contrast, the use of computerized neurocognitive testing has shown a 19% increase in sensitivity over self-reported symptoms. In this study, which used the immediate post-concussion assessment and cognitive testing (ImPACT) computerized neurocognitive assessment, the use of symptom and neurocognitive test results demonstrated a 29% increase in sensitivity compared to the use of symptoms alone. Of note, the control (non-concussed group) had no subjects with both symptoms and abnormal neurocognitive assessment scores.¹⁷ Another study that used the ImPACT exam demonstrated a sensitivity of 81.9% and a specificity of 89.4% for concussion. The ImPACT exam is the only computerized neurocognitive assessment tool with documented sensitivity and specificity for concussion.¹⁸

Finally, a recent study found that brain abnormalities noted on post-concussion functional MRI scans correlated with neuropsychological and symptom data. Athletes who demonstrated areas of hyperactivation on functional MRI scans had a more prolonged recovery than athletes without those findings. In addition, resolution of the hyperactivation correlated with recovery as measured by the ImPACT exam.¹⁹ The linking of physiologic brain abnormalities and results of neuropsychological testing further validates the use of computerized neurocognitive assessments in the evaluation of concussion and mTBI.

The 2008 International Symposia on Concussion in Sport released a consensus statement that supports the use of neuropsychological testing, but also points out that it should not be the sole basis for management decisions.²⁰ As the third leg of the evaluation triad, which includes a history and physical exam, neurocognitive testing is an important part of the comprehensive evaluation. It can serve both as an initial screening tool and as a method of tracking recovery with increase sensitivity over symptoms alone, and has been correlated with abnormal findings of brain physiology.

CLASSIFICATION OF INJURY

Over the last 35 years, multiple grading systems have been proposed in the classification of head injury. The consensus statement released following the Second International Conference on Concussion in Sport in 2005 proposed a new classification for sports concussions, introducing the concept of simple (taking less than 10 days to recover) vs. complex (taking greater than ten days to recover) concussions.²¹ Subsequently, following the latest International Conference on Concussion

in Sport, this terminology was abandoned.²² Despite its abandonment by consensus from the latest international conference, there is evidence that in the first few days after an injury, the combination of symptoms and computerized neurocognitive testing can discriminate between simple and complex concussions. A study of 114 concussed football players revealed that when compared to those with simple concussions, players with complex concussions performed more poorly on neurocognitive testing and reported more symptoms. This study used the ImPACT exam as its neurocognitive test and showed that athletes with complex concussions were 18 times more likely to have three unusually low test scores on the exam. Further analysis revealed that the positive predictive value of this finding is 0.94. Symptom scores were also significantly different and those players with a symptom score of 40 or more were seven times more likely to have a complex concussion.²³ The ability to use a neurocognitive assessment tool to give prognostic information for military providers is an important aspect of the simple and complex classifications. Because the simple and complex classification system is correlated with recovery time, the authors recommend the use of this system in a forward deployed environment. Military commanders can more effectively manage personnel and plan combat operations armed with more accurate prognostic data than is currently available through the use of the MACE.

TREATMENT OF MTBI

The focus of mTBI treatment encompasses several areas: management of symptoms, prevention of further injury, graduated increase in physical and cognitive exertion, and patient education. The evidence for effective treatments of mTBI is indirect and is related to what is known to worsen symptoms and prolong recovery. Symptom management in the acute phase is mainly focused on the treatment of headache. Sleep disorders, attention disorders, and anxiety can also be consequences of mTBI, but will not be discussed because those Soldiers suffering these symptoms to the extent that pharmacologic therapy is necessary should be evacuated to a higher level of care for management.

A 2009 MEDLINE search found no good clinical studies on effective treatment of headache in the mTBI patient.²⁴ One recent review states, "pharmaceutical treatment strategies with proven clinical benefits are still lacking."²⁵ An earlier review came to the same conclusion, stating that "at the present time the clinician has no evidence based pharmacological treatment to offer the concussed athlete."²⁶ Currently, acetaminophen and/or non-steroidal anti-inflammatory drugs (NSAIDs) are considered first line treatments, though there is a theoretical consideration that treatment with NSAIDs could worsen undiagnosed intracerebral hemorrhage.

Evidence for prevention of further injury is much clearer. Protection from the potential for second-

impact syndrome has already been discussed. The pathophysiology of this disorder appears to be related to the loss of the brain's auto-regulatory mechanisms for a period of time after an initial injury, making the brain more vulnerable to low-level impacts.²⁷ Limiting the duties of Soldiers recovering from mTBI serves to reduce their risk of sustaining a second impact during the recovery period. Given the devastating clinical effects that can result from a low-level second impact, it is clearly a prudent course of action.

Another important aspect of prevention of further injury is revealed through research that shows high levels of physical and cognitive activity after injury are related to poorer neurocognitive performance in follow-up testing. The athletes who had the best symptom scores and neurocognitive performance were those who did moderate levels of exercise after the injury.²⁸ Though more research is clearly needed, this study supports the recommendation for a graded return-to-play (or duty) protocol, which can be individualized based on the complete evaluation of the athlete or Soldier. The 2008 International Symposia on Concussion in Sport and the 2006 CDC "Heads Up: Brain Injury in Your Practice" physicians tool kit both support return-to-play plans for the athlete that involve graduated increases in functional exercise.^{29, 30}

Patient education has also been shown to decrease the anxiety and symptom prevalence after injury. A 2002 study looked at 202 adults with mild head injury and divided them into two groups; one received a one week follow-up visit and information booklet, as well as a three month follow-up visit, and one that only received follow-up at three months. The group that received an information booklet outlining the symptoms associated with head injury and coping strategies demonstrated fewer overall symptoms and were significantly less stressed at their three month follow-up visit.³¹

These areas of mTBI treatment discussed involve treatments (headache management) and interventions (protection from injury exposure, use of a step-wise rehabilitation protocol, and patient education) that can be accomplished by primary providers in a forward deployed setting with minimal resources. Soldiers with evidence of more severe injuries or those that are unresponsive to the conservative therapies discussed should be evacuated to a higher level of care for specialty evaluation and treatment.

CURRENT DEPARTMENT OF DEFENSE (DoD) AND DVBIC RECOMMENDATIONS:

The DoD and DVBIC mTBI guidance (www.dvbic.org) has been regularly reviewed and updated, but in light of the above discussion, there are two areas where improvements can be made: The use of the automated neuropsychological assessment metrics (ANAM) as a computerized neurocognitive assessment tool and the formalization of a graduated return-to-duty

protocol. The ANAM has been extensively used as a pre-deployment baseline neurocognitive test as directed by the Assistant Secretary of Defense for Health Affairs.³² Normative data for the military population has been studied and generated.³³ However, as a tool that military providers can use in the assessment of patients with known or suspected mTBI, a MEDLINE search of relevant topics failed to return any published studies that look at its use in mTBI diagnosis and management. The only published study to look at ANAM data and Soldiers with a history mTBI or postconcussive symptoms showed no association between poor ANAM performance and history of TBI, injury severity, or presence of problematic postconcussive symptoms.³⁴ In addition, it is not easily accessible in the deployed theaters of operations, and generally requires evacuation to the level of a theater hospital (Level III) for testing. Medical providers forward of the theater hospitals have no tool other than the MACE, which has been shown to have reliability problems with repetitive use in the same patient. The latest updated mTBI clinical guidance from the DVBIC encourages progressive physical activity to the maximum extent (without symptoms) by Soldiers with mTBI. A more formalized approach as recommended by the International Symposia on Concussion in Sport and the CDC Physician's Toolkit may be beneficial in applying a standardized method across the military population. Improvements need to be made in the existing DoD and DVBIC clinical guidance in order to give providers forward of the theater hospitals the best and most relevant tools to diagnose and manage Soldiers with known or suspected mTBI.

THE USASOC NEUROCOGNITIVE TESTING AND POST-INJURY EVALUATION AND TREATMENT PROGRAM

Premature return-to-duty not only can result in an increased risk of re-injury and long term complications for the patient but it can also put other team members at increased risk of danger due to the suboptimal performance of the injured individual. Further complicating the issue is the fact that return-to-duty decisions often are made in a chaotic environment with limited resources.³⁵ Recognizing the limitations of the DoD and DVBIC recommendations noted above, USASOC has developed an evidence-based program for use by providers at the lowest levels (i.e., by Battalion and Group or Regimental medical providers). This program incorporates the standards of care used in the sports medicine community: Asymptomatic at rest prior to returning to activity, asymptomatic with both physical and cognitive exertion, and a return to baseline neurocognitive testing.³⁶ The USASOC program uses the ImPACT computerized neurocognitive assessment exam as a tool in the evaluation of Soldiers with suspected mTBI. The ImPACT exam was chosen because it has documented sensitivity and specificity

for concussion diagnosis, it is easily accessible for both baseline and post-injury testing, and can easily be used by USASOC medical providers. In addition, this program incorporates a formal graduated rehabilitation protocol to get Soldiers back to full duty. At this time the USASOC program does not include a formalized assessment of postural stability such as the BESS, but that is under consideration.

CASE DISCUSSION

The lack of a quantitative measurement tool for evaluation and monitoring of suspected mTBI casualties has been a concern for military medical providers throughout the duration of OIF and OEF. This concern is amplified among the forward deployed medical providers of Special Operations Forces (SOF) units, primarily due to the vast distances often experienced between the operational teams and higher levels of medical care. The case report described at the beginning of this article is an excellent example of the challenges faced by medical providers throughout the SOF environment. The need for clinical practice guidelines supported by an accurate, readily available, objective test for evaluation of mTBI is demonstrated in this case report.

In this case, the injured Soldier was stationed at a FOB which was co-located with a Forward Surgical Team (FST). This facilitated the Soldier being evaluated by the FST physician after his initial injury; however, despite the completion of the ANAM prior to his deployment, the ANAM score was unavailable to the FST physician or the battalion surgeon for comparative analysis. Additionally, due to the constraints of the ANAM testing process, even if pre-injury scores were available, no published data is available to guide the medical treatment or support the evacuation of this Soldier. Using existing DVBC guidelines, his score of 24 out of 30 on the MACE should have triggered 24 hours of rest and a re-evaluation, which he did not receive. Later in his course he was able to score 27 out of 30 on the MACE (a score of <25 is considered abnormal) while continuing to have significant symptoms, further revealing the limitations of this tool in consecutive evaluations. The location of the FST relative to higher U.S. medical care was an issue as well. Due to distances, medical evacuation was not possible using rotary wing assets without aerial refueling capabilities. As a result, a "routine" evacuation of this Soldier would feasibly require two to three days to accomplish and would likely require the same if not more time to return him to his unit once medically cleared.

Additionally, this Soldier possessed a specific skill set which was not redundant on his operational detachment, and his evacuation to higher medical care would negatively impact the capabilities of his unit. The Soldier was aware of the need for his skills and the challenges in evacuating him from his location. Therefore, as is frequently observed in SOF Soldiers, the individ-

ual minimized his symptoms in order to remain with his detachment. Specifically, he did not seek follow-up medical care until he became incapacitated following his third mission.

Deployed medical providers are often forced to make decisions in reference to evacuation which have implications for the well-being of the Soldier as well as impact to the unit. However, these decisions are frequently simplified due to the nature of the injuries and the clear need for medical evacuation in order to prevent further injury or disability to the patient. Due to the broad spectrum of TBI and the difficulty of making a well informed decision in the absence of "solid" data, these generally straight forward decisions become blurry in the face of potential head injuries. Furthermore, convincing arguments to commanders are difficult in the absence of solid, tangible, medical data which support the medical evacuation or duty limitations for the injured Soldier.

If available at the time, the USASOC neurocognitive testing CPG would have directed this individual to be screened following the initial injury based on his "significant mechanism of injury." If presented with an objective assessment, which could potentially clear the patient for return-to-duty or validate the need for medical evacuation, the stigma of seeking medical care for a potential mTBI would be minimized. This Soldier clearly had mTBI, and demonstrated worsening of his symptoms with the physical stresses of multiple missions, as well as second-impact syndrome. This hypothesis is supported by the fact that he was the only Soldier to suffer symptoms following exposure to the second and third blasts despite other team members being in the same proximity to the blasts. The availability of a neurocognitive test like the ImPACT exam at the FOB, used in conjunction with a focused history and physical exam, clear patient education, and an individualized rehabilitation program would have prevented this Soldier from suffering the complications described, and likely would have prevented his evacuation from the theater. Computerized neurocognitive testing alone will not resolve the complexities surrounding the management of mTBI. However, the use of a computerized neurocognitive assessment in conjunction with clear guidelines and supported by substantiated medical data is a powerful tool in the aid bag of the forward deployment provider.

CONCLUSION

USASOC is currently in the process of implementing this program. Provider education began in November 2009 and baseline testing of a select unit started in December 2009. Baseline testing and educational initiatives will be expanded to the rest of the deploying force over the next several months.

Current research initiatives will undoubtedly lead to further refinements of the USASOC, DoD, and

DVBIC programs. As USASOC gains experience with the IMPACT, the prognostic accuracy will continue to be refined along with further development of criteria that will differentiate between simple and complex mTBI early in the clinical course. With the incorporation of new strategies based on the latest evidence and clinical research, improvements in mTBI diagnosis and management will continue to be made.

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APPENDICES

1st CPG

2nd Rehab Guidelines

3rd Patient Information Sheet

**USASOC NEUROCOGNITIVE TESTING AND POST – INJURY EVALUATION AND TREATMENT
CLINICAL PRACTICE GUIDELINE (CPG)**

Note: *The intent of this CPG is to serve as general guidance for medics and medical officers. It should not supplant good clinical judgment and experience. In addition, providers should be familiar with the Joint Theater Trauma System CPG for “Management of Mild Traumatic Brain Injury (mTBI)/Concussion in the Deployed Setting.” Operational and tactical considerations may, in some instances, override the CPG. This is a working document, and as we gain experience with the test and the procedures it will be modified. Send comments and suggestions to: robert.h.lutz@ahqb.soc.mil.*

1. RECOGNITION OF INJURY POTENTIAL AND GENERAL PRINCIPLES:

A. All Soldiers who receive a head injury should be evaluated for evidence of mild traumatic brain injury (mTBI). The initial evaluation should consist of a focused history and physical exam. All Soldiers with clinical signs of head trauma, symptoms of head injury, or a significant mechanism should receive a more detailed evaluation. Consider using the Military Acute Concussion Exam (MACE) as an initial screening tool as part of the decision making process.

B. The goal of this program is early identification of Soldiers with a mild injury that initially may not be readily apparent. These mild TBI injuries if not treated appropriately put the Soldier at risk for developing chronic problems or “second-impact syndrome.”

C. Those Soldiers with severe or potentially severe head-injuries are beyond the scope of this CPG. This group of Soldiers needs evacuation to a higher level of care where imaging (non-contrast head CT) and surgical capability are available. After evaluation at a higher level of care and structural brain trauma has been ruled out, these Soldiers may be returned to the unit through the medical system. At that time it is appropriate for them to be reevaluated through this CPG.

1) **Criteria for imaging:** The American College of Emergency Physicians published a Clinical Policy in December, 2008, titled, “Neuroimaging and Decisionmaking in Adult Mild Traumatic Brain Injury in the Acute Setting.” A thorough review of the available literature was examined to answer the question “which patients with mild TBI should have a noncontrast head CT scan in the ED?” The recommendations are as follows:

2) Level A recommendations (generally accepted principles for patient management that reflect a high degree of clinical certainty): A noncontrast head CT is indicated in head trauma **patients with loss of consciousness or posttraumatic amnesia** only if one or more of the following is present: headache, vomiting, age greater than 60 years, drug or alcohol intoxication, deficits in short term memory, physical evidence of trauma above the clavicle, posttraumatic seizure, GCS score of less than 15, focal neurologic deficit, or coagulopathy.

3) Level B recommendations (recommendations for patient management that may identify a particular strategy or range of management strategies that reflect moderate clinical certainty): A noncontrast head CT should be considered in head trauma patients **with no loss of consciousness or posttraumatic amnesia** if there is a focal neurologic deficit, vomiting, severe headache, age 65 years or greater, physical signs of basilar skull fracture, GCS less than 15, coagulopathy, or a dangerous mechanism of injury (including ejection from a motor vehicle, pedestrian struck, fall from height of more than three feet or five stairs)

4) Keep in mind that these recommendations are based on studies from the civilian population. There are no studies that look at head injuries from blasts and explosions. Providers will need to maintain an index of suspicion based on the described nature of the mechanism of injury, and use that in their determination of the need for noncontrast CT of the head.

D. The “PIE’s” principle is an important framework within which to work. Keep the Soldier in “Proximity” to his unit and support network. Recognize and begin evaluation and treatment “Immediately” as soon as potential for TBI is considered. Treat the Soldier with the “Expectancy” that they are going to get better and return-to-duty fully recovered.

E. Education is a **very important** component of treatment. Many of the symptoms of mTBI are concerning for our Soldiers. They should be educated to understand that they are normal symptoms and the majority of them will improve with time and rest.

2. EVALUATION AND DISPOSITION OF SOLDIERS WITH SUSPECTED MTBI:

A. **Initial field evaluation:** The purpose of the initial evaluation in the field is to determine the need for urgent evacuation. Urgent evacuation is required for those Soldiers that are exhibiting signs/symptoms of a potentially severe head injury. Signs or symptoms that indicate the presence of diffuse axonal injury, intracranial bleeding with mass effect, or penetrating head injuries include, but are not limited to:

- Prolonged loss of consciousness
- Progressively declining level of consciousness
- Progressively declining neurological exam
- Seizures
- Repeated vomiting
- Sensory or motor neurological deficit

B. Evaluation in clinical setting (Army Health Clinic, Aid Station, or Forward Operating Base [FOB] Clinic): Once the Soldier is removed from the field setting, a more thorough evaluation can be conducted. The goal of this evaluation is to determine the extent (or potential extent) of the injury and establish diagnostic and treatment priorities. This evaluation should consist of a detailed history, physical exam, and if indicated, imaging studies and/or neurocognitive testing. The MACE may also be used in the initial evaluation to aid in the decision making process.

1) **Injury history:** A thorough review of the history of the injury, with a focus on symptoms consistent with head injury. Some of these symptoms may be not apparent to the Soldier, but clearly recognized by teammates or other Soldiers. Consider talking with friends, supervisors, and subordinates in order to get their assessment of the Soldier’s behavior. Such symptoms include:

- Headache
- Amnesia (retrograde or anterograde)
- Confusion
- Unusual behavior or emotional changes
- Irritability
- Balance problems
- Vertigo and dizziness
- Photophobia
- Decreased tolerance to noise
- Vision changes
- Lethargy
- Nausea/vomiting

2) **Physical exam:** A thorough physical exam and neurologic exam is required when a Soldier is being evaluated for the presence of mTBI. Indications of the potential for mTBI include:

- Ruptured tympanic membranes
- Trauma to the head/neck (penetrating and non-penetrating)
- Cranial nerve deficits
- Sensory deficits
- Motor deficits
- Inability to do rapid alternating movements
- Visual field deficits
- Abnormal mini mental status evaluation
- Abnormal vestibular screening exam:
 - Inability to maintain balance
 - Persistent nystagmus
 - Tracking/convergence problems with extraocular movements

3) **Neurocognitive testing:** USASOC Soldiers with any of the above indicators of mTBI should be evaluated using the Immediate Post-Concussion Testing and Cognitive Assessment (ImPACT) Exam. This evaluation should take place no earlier than the day after the injury, and after that can be conducted at any time post-injury. Testing can be done by any trained medical officer or medic. Ideally, the Soldier will have a baseline test to compare against. If no baseline is available, comparison will be made against normative population data. Test interpretation is only to be done by a trained licensed provider. Indicators of mTBI include:

a) **If baseline test available:** Test results that show deviation outside of the reliable change index (RCI) in one or more areas of the test.

b) **If no baseline test available:** Test results with two or more scores that fall below the 25th percentile in either the verbal memory, visual memory, reaction time, or processing speed components of the test. This finding occurs in less than 13% of a normal population.

C. Diagnosis of mTBI: Based on the complete evaluation (history, physical exam, and neurocognitive testing), the Soldier can be placed in one of four diagnostic categories: No evidence of mTBI, simple mTBI, complex mTBI, severe or potentially severe head injury. In addition to the clinical impression from the history and physical exam, neurocognitive testing can aid in placing the Soldier in a diagnostic category. Use the ImPACT scoring and diagnostic category criteria below as general guidance.

1) **No evidence of mTBI:** No ImPACT subcomponent scores outside of the RCI, minimal symptoms at most.

2) **Simple mTBI:** ImPACT symptom score range below 30 and/or only one ImPACT subcomponent score outside of the RCI or two subcomponent scores below the 25th percentile (if no baseline available). These Soldiers will likely get better quickly with full resolution of symptoms in less than 10 days. Early return-to-duty before meeting criteria may exacerbate the injury and worsen the length and scope of symptoms.

3) **Complex mTBI:** ImPACT symptom score above 30 and two or more ImPACT subcomponent scores outside of the RCI or below the 16th percentile (if no baseline available). These Soldiers will likely take longer to recover and full resolution of symptoms may take longer than 10 days. As with low-risk mTBI, early return-to-duty before meeting criteria may exacerbate the injury and worsen the length and scope of symptoms. However, these Soldiers will take longer to heal and providers should resist efforts to push through symptoms as this may delay recovery and increase the risk for the development of chronic post-concussive symptoms.

4) **Severe or potentially severe head injury:** Evidence of more severe injury requiring imaging (if not available at your location), potential need for neurosurgical intervention, or potential for further deterioration and need for supportive care such as airway control.

3. TREATMENT AND DISPOSITION OF SOLDIERS WITH MTBI:

Disposition of Soldiers diagnosed with mTBI: Based on the complete evaluation (history, physical exam, and neurocognitive testing), the Soldier can be placed in one of four categories: Return-to-duty, light duty, quarters, or evacuate to higher level of care. The importance of light duty and quarters cannot be overstated. Recovery time from mTBI can be delayed if not treated properly, and the cornerstones of treatment are physical and cognitive rest. Commanders need to be educated that “light duty” includes both physical and mental light duty.

A. No evidence of mTBI: Return-to-duty, no treatment indicated

B. Simple mTBI:

1) Treatment:

Rest: 72 hour light duty profile.

Headache: Treat with acetaminophen (may use naproxen if no suspicion of intracranial hemorrhage); do not use narcotics.

Post-concussion rehab: After 72 hours rest, begin at Stage 1, if tolerated. May advance rapidly as tolerated (no symptoms at completion of exercise protocol) to Stage 5. If symptoms develop during any stage, then stop exercise, and restart at previous asymptomatic stage once symptoms resolve. Balance exercises as indicated by screening.

2) Disposition: Light duty profile for at least 72 hours, with restrictions on both physical and cognitive work.

3) Follow-up: Focused provider re-evaluation every 24 hours, repeat ImPACT in five to seven days, earlier if symptoms resolve.

C. Complex mTBI:

1) Treatment:

Rest: 72 hours quarters.

Headache: Treat with acetaminophen (may use naproxen if no suspicion of intracranial hemorrhage); do not use narcotics.

Post-concussion rehab: After 72 hours rest, begin Stage 1, if tolerated. Advance slowly, no more than one stage per day, and only if symptom free. 95% of Soldiers with 3 or more ImPACT scores outside of the RCI will not be able to return-to-duty within 10 days. Accelerating the rehab protocol only has the potential to worsen the injury – so advance with caution. Balance exercises as indicated by screening.

2) Disposition: Quarters for at least 72 hours, with both physical and cognitive rest. Soldier should maintain normal sleep/wake cycles. Follow with light duty profile until cleared to return-to-duty.

3) Follow-up: Focused provider re-evaluation every 24 hours, repeat ImPACT in 7 to 10 days, earlier if symptoms resolve.

D. Severe or potentially severe head injury:

- 1). **Treatment:** As indicated by trauma protocols.
- 2). **Disposition:** Evacuate per protocol to higher level of care.

4. RETURN-TO-DUTY CRITERIA:

Recommended return-to-duty criteria are as follows:

- A. Resolution of symptoms (off medications) with standard cognitive activities required of position.
- B. Tolerance of Stage 5 full exertion physical activity without symptoms (off medications).
- C. Return of ImPACT score to within the RCI for each subcomponent, if a baseline test is available for comparison. If no baseline test available, then follow the trend of the examination results as the Soldiers symptoms improve. Based on normative data, 33% of the population will have at least one score less than the 25th percentile. Two scores less than the 25th percentile occurs in less than 13% of the population.

5. FAILURE TO IMPROVE OR PROGRESS:

Providers should strongly consider evacuating Soldiers who fail to progress within 14 days, or exhibit worsening symptoms despite conservative management and should consult with the nearest neurologist for management recommendations. In addition, the potential for an acute combat stress reaction or pre-existing illness (i.e. sleep apnea) as a component of the Soldier's symptom complex should be considered.

6. SPECIAL SITUATIONS:

Soldiers who perform complex tasks including (but not limited to) close quarter battle, room clearing, piloting an aircraft, or any other job/position that requires split second timing and rapid visual recognition/reaction, may require further evaluation prior to being returned to duty. Check rides for pilots and shoot/no shoot decision simulations (CQB range) should be considered prior to return to full duty, particularly if there are indications from neurocognitive testing that reaction time and visual motor speed are not back to baseline (but still within the RCI).

USASOC GUIDELINES FOR POST-CONCUSSION REHABILITATION

Rehabilitation Stage	Physical Therapy Program	Recommended Exercises
Stage 1 <u>Target Heart Rate:</u> 30-40% of maximum exertion <u>Recommendations:</u> exercise in quiet area; no impact activities; balance and vestibular exercises as needed; limit head movement/position changes; limit concentration activities; 10-15 minutes light cardio	<ul style="list-style-type: none"> - Very light aerobic conditioning - Sub-max isometric strengthening - ROM/Stretching - Low-level balance activities 	Stationary Bike; seated elliptical; treadmill walking (10-15 minutes) Quad sets; Ham sets; light hand weights; resistive band rowing; SLR's; resistive bands ankle strengthening Cervical ROM exercise; trap/LS stretching, pec stretch; hamstring stretching, quad stretching, calf stretching Romberg exercises, single leg balance
Stage 2 <u>Target Heart Rate:</u> 40-60% of maximum exertion <u>Recommendations:</u> exercise in gym areas; use various exercise equipment; allow some positional changes in head movement; low level concentration activities; 20-30 minutes of cardio	<ul style="list-style-type: none"> - Light to moderate aerobic conditioning - Light weight - Active stretching - Moderate balance activities; initiate activities with head position changes 	Treadmill; stationary bike; elliptical (20-30 minutes) Light weight strength exercises, resistive band exercises; wall squats; lunges; step up/downs Any stage 1 stretching; active stretching as tolerated Romberg exercises, VOR exercise (walking with eyes focused and head turns); Swiss ball exercises; single leg balance exercises
Stage 3 <u>Target Heart Rate:</u> 60-80% of maximum exertion <u>Recommendations:</u> any environment ok; integrate strength, conditioning, and balance/proprioceptive exercises; can incorporate concentration challenges; 25-30 minutes of cardio	<ul style="list-style-type: none"> - Moderately aggressive aerobic exercise - All forms of strength exercise - Active stretching exercise - Impact activities (running, plyometrics) - Challenging proprioceptive and dynamic balance; challenging positional changes 	Treadmill (jogging); stationary bike; elliptical (25-30 min) Resistive weight training including free weights; functional squat; dynamic strength activities Active stretching (lunge walks, side to side groin stretching, walking hamstring stretch) Initiate agility drills (zig-zag runs, side shuffle), jumping on blocks Higher level balance activities: ball toss on plyo floor, balance discs, squats and lunges on BOSU ball
Stage 4 <u>Target Heart Rate:</u> 80% of maximum exertion <u>Recommendations:</u> resume aggressive training in all environments	<ul style="list-style-type: none"> - Non-contact physical training - Aggressive strength training - Impact activities/plyometrics - Job-specific physical training 	Program to be designed by unit physical therapist Interval training Job-specific drills/training
Stage 5 <u>Target Heart Rate:</u> Full exertion <u>Recommendations:</u> Full activities and combat training	<ul style="list-style-type: none"> - Resume full physical training with contact - Continue aggressive strength and conditioning exercises - Job-specific activities (shooting, CQB training, fast-roping) 	Program to be designed by unit physical therapist Train at full combat intensity

USASOC Concussion Patient Information Sheet

1. What is a Concussion?

A concussion, sometimes called a mild traumatic brain injury (mTBI), is an injury that is caused by a blow or jolt to the head that briefly knocks you out (lose consciousness) or makes you confused or “see stars.” In combat, concussions are usually caused by an explosion, fall, direct impact, or motor vehicle accident. Some, but not all, people with a concussion lose consciousness.

2. Why is this important?

Often after a concussion Soldiers think they are OK, yet a concussion may affect your ability to perform at your best. You should seek medical treatment from the nearest medic or medical officer as soon as possible after any injury where there may be a chance of a concussion. Your medic or medical officer will evaluate your injury and decide if it is safe for you to return-to-duty. Returning to duty too early from an injury can put you at greater risk for a more serious injury, and in addition, can cause a mild injury to become more serious.

3. What are the symptoms associated with concussion?

There are many symptoms associated with concussion. These are normal symptoms that can be very disturbing, but will resolve with time, rest, and treatment. These symptoms include:

Headache	Nausea/Vomiting	Dizziness
Fatigue	Sleep Disturbances	Difficulty Remembering
Noise Sensitivity	Light Sensitivity	Blurry Vision
Loss of Balance	Trouble with Concentration	ringing in the Ears
Irritability	Excessive Tiredness	

4. How is concussion diagnosed?

A concussion diagnosis is based on the specific circumstances of your injury, your symptoms at the time of injury, and an examination. Tests of your memory and concentration may be done on the computer or with a series of questions.

5. Does medicine help?

The treatment for concussion is limited duty and rest. Rest includes both physical and mental rest. You should refrain from doing mentally taxing activities such as reading, playing video games, or watching excessive amounts of TV. If you have a headache, you can usually take acetaminophen (brand name: Tylenol). Other medications like ibuprofen and aspirin should only be taken upon the advice of a medical provider. Narcotics (strong pain relievers) should be avoided.

6. When can I return-to-duty?

After your evaluation, you will be given a plan to follow with the assistance of your unit medical personnel. This plan will involve rest, and a gradual return to normal duties. As you increase your activity level, you need to back off if symptoms return. This means you still need more time to heal. You should not return-to-duty until your symptoms are completely gone and you are able to resume full activities without their recurrence. You also may be asked to take a computer test to help evaluate your ability to return to full duty.

7. Are there any lasting effects to a concussion?

Almost all people recover completely following a concussion. Multiple concussions without letting you fully heal in between can cause prolonged symptoms that will increase your recovery time.

8. What else should I know about my recovery?

Do:

Get plenty of rest
Return to activities according to the plan developed by your medic or medical officer
Stay hydrated

Don't:

Overexert yourself
Participate in contact sports or high-risk activities until cleared by your unit medic or medical officer
Drink alcohol



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Evaluation and Treatment of Persistent Cognitive Dysfunction Following Mild Traumatic Brain Injury

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Members of Consensus Conference

ABSTRACT

The Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury (DCoE) and the Defense and Veterans Brain Injury Center (DVBIC) hosted a consensus conference to address persistent cognitive impairments following mild traumatic brain injury (mTBI) and the role of cognitive rehabilitation in this population. Fifty military and civilian subject matter experts developed clinical guidance for cognitive rehabilitation of Service members with cognitive symptoms persisting three or more months following injury. This article highlights the initial evaluation, comprehensive assessment and treatment recommendations contained within the guidance “Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury and Defense and Veterans Brain Injury Center Consensus Conference on Cognitive Rehabilitation for Mild Traumatic Brain Injury.” The full clinical guidance is available at: (<http://www.dcoe.health.mil/Resources.aspx>).

Mild TBI (mTBI) remains one of the most common injuries sustained by those serving in Operation Enduring Freedom and Operation Iraqi Freedom (OEF/OIF) due to the widespread use of explosive weapons, the increased survival rate due to advances in body armor and helmets, and increased awareness and screening for mTBI (Terrio et al., 2009). However, the true incidence of mTBI in OEF/OIF is unknown. Many servicemembers with mTBI do not seek medical care and therefore their injuries go unrecognized and unreported. Estimates of self-reported mTBI by servicemembers who served in Afghanistan and Iraq since 2001 range from 15-22% (Hoge et al., 2008; Terrio et al., 2009). Mild TBI as defined by the Department of Defense (DoD) is a traumatically induced structural injury and/or physiologic disruption of brain function as a result of an external force that is indicated by new onset or worsening of at least one of the following clinical signs, immediately following the event: period of loss of or a decreased level of consciousness 0 to 30 minutes; loss of memory for events immediately before or after the injury up to 24 hours; alteration in mental state at the time of the injury (confusion, disorientation, slowed thinking, etc) up to 24 hours; neurological deficits (weakness, loss of balance, change in vision, praxis, paresis/plegia, sensory loss, aphasia, etc) that may or may not be transient (Government report, 2007).

The substantial majority of individuals with mTBI have symptoms that last only a short period of time recovering within minutes to several weeks (McCrea, 2008). However, 5-15% of individuals who sustain an mTBI have symptoms that persist beyond this period of time and/or have functional limitations (Iverson et al., 2006; Ruff et al., 1996). There is strong consensus in the literature that persistent cognitive and emotional symptoms following mTBI can result in significant functional deficits and should be treated.

Because clinicians currently face an increasingly large

population of Wounded Warriors who have sustained an mTBI with a portion developing chronic symptoms and functional limitations, including cognitive impairment, the Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury (DCoE) and the Defense and Veterans Brain Injury Center (DVBIC) hosted a two-day consensus conference to address this issue. The term cognitive rehabilitation will be used synonymously with terms such as neurorehabilitation, neuropsychological rehabilitation, cognitive remediation, and cognitive retraining.

The DCoE/DVBIC Consensus Conference included fifty subject matter experts from the Department of Defense, the Department of Veterans Affairs, civilian rehabilitation centers, and academia and included a broad range of clinical and scientific disciplines. Military representatives were selected by their respective Surgeons' General offices. Representatives from the National Guard, Reserves, Special Operations, and Line also participated. The purpose of the Consensus Conference was to create guidelines regarding cognitive rehabilitation for the Service member who is three months or more post-concussion, has persistent post-concussive cognitive symptoms, and is receiving treatment in a military medical setting.

Cognitive rehabilitation has been identified as a well-accepted and common component of comprehensive rehabilitation for persons with moderate and severe TBI (Cicerone et al., 2005) and increasingly is used for persons with persistent symptoms following mTBI (Gordon et al., 2006). The American Congress of Rehabilitation Medicine defines cognitive rehabilitation as “a systematic, functionally oriented service of therapeutic activities that is based on assessment and understanding of the patient's brain-behavioral deficits” (Cicerone et al., 2000, p 1597). The goal of cognitive rehabilitation is to improve a person's ability to perform cognitive tasks by retraining previously learned skills, teaching compensatory strategies,

and making environmental modifications to the individual's domestic and work setting (Tsaousides & Gordon, 2009).

The conference attendees addressed the areas of assessment, intervention, outcome measurement, and program implementation. This article highlights the areas of assessment and therapeutic interventions.

REFERRAL

Referral to initial evaluation for cognitive rehabilitation can be made by any provider. Cognitive symptoms may be observed by the provider, reported by the patient, family, community, or any combination of the above. A referral may also be made even if the patient does not report cognitive symptoms but displays evidence of cognitive dysfunction in his/her daily social or occupational functioning.

ASSESSMENT

The initial evaluation is required to determine the clinical indication for cognitive rehabilitation and to guide the treatment plan. This evaluation should be conducted within 30 days of referral and in the primary care setting by a TBI-experienced provider (e.g., nurse, nurse practitioner, physician assistant) who is also familiar with other deployment-related health conditions. The purpose of this initial evaluation is to determine if the individual has a history of an mTBI with persistent cognitive symptoms or signs of cognitive impairment (self-reported or observed/reported by the patient's family, command, or community) and to determine if the individual has any co-morbidities that may affect cognitive function. This process should include a thorough intake history to include description of the injury event and the duration of loss of consciousness or altered mental status, confirmation of mTBI diagnosis, evaluation of ongoing symptoms using a tool such as the Neurobehavioral Symptom Inventory (NSI) or the Posttraumatic Stress Disorder Checklist – Military or Civilian Version (PCL-M, PCL-C), a mental health evaluation, and an evaluation for chronic pain, sleep disorders, and substance abuse. The patient will likely match one of the following scenarios:

1. The patient does not have any cognitive symptoms. Education and reassurance to both referring provider (if different from provider conducting the initial assessment) and patient should occur.

2. There are no indications that the patient sustained an mTBI but cognitive symptoms are present. The patient should be referred back to the primary care provider for further evaluation of either a medical or mental health condition.

3. The patient has other co-morbidities or other symptoms (chronic pain or substance abuse) that are too severe for him/her to undergo cognitive assessment. The patient should be referred to the appropriate specialty clinic and have a case manager assigned. If the patient is referred to a specialty clinic, he/she should be re-evaluated for cognitive rehabilitation in four weeks in addition to receiving case management follow-up. This will ensure that these patients may still receive a cognitive assessment and that they are not lost to follow-up. If referred to a specialty clinic and all the cognitive symptoms resolve, the patient should be followed via monthly telephone consultation by the case manager to ensure that the symptoms remain resolved for six months.

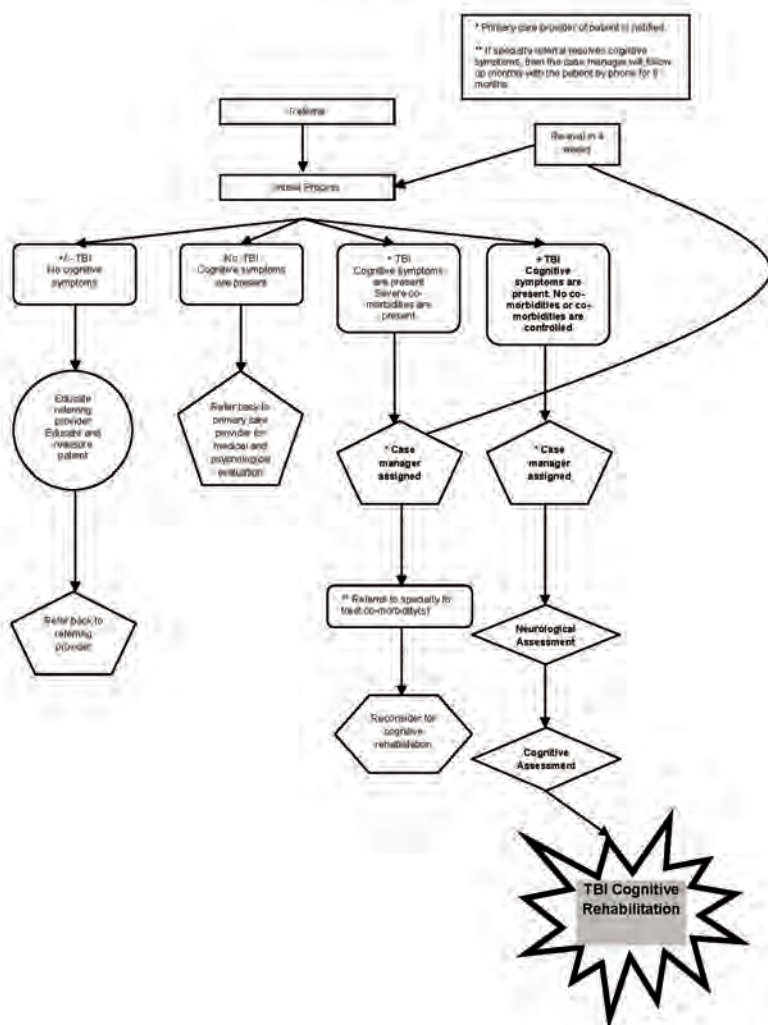
4. The patient sustained an mTBI and has symptoms that warrant further cognitive assessment.

It should be noted that any suspicion of an mTBI with persistent cognitive symptoms is reason for referral for further cognitive evaluation. After the patient has undergone this initial evaluation, a note should be sent to the patient's primary care provider and the referral source (if different) to ensure continuity of effective communication and treatment coordination.

COMPREHENSIVE COGNITIVE ASSESSMENT

If the results of the initial evaluation indicate the need for further cognitive assessment, the patient must first undergo a comprehensive neurological examination. This comprehensive neurological examination does not need to be completed by a neurologist, but rather, can be completed by a physician with sufficient expertise and knowledge in the examination and medical work-up of cognitive symptoms. During this time, if any other medical conditions that may result in cognitive impairment are found, then they should be further evaluated and

Figure 1
Referral Process



treated. This comprehensive examination should also include a thorough review of the medical records to look for prior cognitive disorders. If no confounding findings are noted, the patient should receive a comprehensive cognitive assessment.

Table 1: Assessment Domains

Attention	
Memory	
Processing Speed	
Executive Functioning	
	reasoning and problem solving
	organizing, planning and self-monitoring
	emotional regulation
Post-Traumatic Stress Disorder (PTSD)	
Post-Concussive Syndrome (PCS)	
Symptom Rating	
Pain Screen	
Symptom Validity Test	
Substance Abuse Screen	
Depression Screen	

The comprehensive cognitive assessment preferably should be performed by an interdisciplinary group that includes a neuropsychologist, occupational therapist, and speech-language pathologist but may be completed by a smaller group if resources are limited. Regardless of the team complement, these providers must be competent in evaluating individuals with known or suspected TBI and be capable of making appropriate differential diagnoses in complicated cases. In all situations, a team leader should be appointed. The cognitive assessment should consist of a thorough neurobehavioral and cognitive evaluation and include measures of effort. There are a variety of neurobehavioral assessment tools and approaches available. While no one tool or method is recommended over another, providers may consider the World Health Organization's (WHO) approach towards the purpose of assessments: to identify and describe strengths, deficits, and effects of the deficits on capacity and function in everyday activities; to identify barriers to successful participation and rehabilitation (Carroll et al., 2004). Another resource is the American Academy of Clinical Neuropsychology's (AACN) guidelines for evaluation (AACN Practice Guidelines for Neuropsychological Assessment and Consultation, 2007). The comprehensive assessment should include a measure of motivation and engagement. Sub-optimal results on measures of effort should not automatically disqualify an individual for consideration for cognitive rehabilitation but rather, should be further evaluated as there are many potential reasons for poor engagement. The key domains that should be evaluated include:

Upon completion of the cognitive assessment, it is important to determine the following:

1. What is the primary factor contributing to symptoms (i.e., is mTBI the primary cause of the symptoms or is a co-morbidity such as major depression considered the primary contributor?)

2. What are the cognitive deficits associated with the diagnosis of mTBI?
3. Is cognitive rehabilitation needed? Warranted?
4. What kind of rehabilitation is needed? (This should be patient specific and target return to daily life functioning)
5. What are the short- and long-term goals (both functional and measurable)?

The cognitive assessment may determine that the patient requires a) a full cognitive rehabilitation program, b) a limited program that assists with goal-setting, or c) a short return-to-duty refresher training to increase confidence in one's ability to return to full duty. The outcome of the assessment should result in a treatment plan. Due to the increased risk of co-occurring disorders seen in patients with TBI (e.g., mood, anxiety and substance use disorders), a mental health assessment and mental health treatment, if indicated, should occur in conjunction with the cognitive assessment and treatment plan.

INTERVENTIONS

There is presently no evidence to suggest that the different mechanisms of injury between combat and non-combat related mTBI result in different cognitive deficits or require different interventions (Belanger et al., 2009). Attention, memory, executive functioning, and social pragmatics are the most common cognitive domains affected by TBI and interventions, such as the examples listed in Table 2, are targeted to these areas. For the full list of interventions, please refer to the Cognitive Rehabilitation Consensus Conference Report.

CONCLUSIONS

Cognitive rehabilitation may be useful in the treatment of Service members with mTBI who complain of cognitive symptoms or display signs of cognitive dysfunction greater than three months post injury. Initial evaluation and assessment are critical elements that determine if cognitive rehabilitation is an appropriate treatment for an individual with persistent cognitive symptoms and help to shape the treatment plan. The DCoE/DVBIC consensus conference and resultant clinical guidance is the first step toward addressing persistent cognitive symptoms and cognitive dysfunction in individuals with mTBI. The DCoE/DVBIC clinical guidance, with its additional emphasis on the standardization of military cognitive rehabilitation program outcome measures, provides the foundation for future research and discussions regarding cognitive rehabilitation in Service members with mTBI. As this area continues to evolve, ongoing refinement of the clinical guidance will ensue.

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Table 2: Examples of Interventions

Area of Cognitive Impairment	Empirically-supported Interventions	Specific Examples
Attention	Attention process training	Completing two cognitive tasks simultaneously
Memory	Various mnemonic techniques	Acronyms
Attention Memory Executive functioning	Memory notebook	PDA
Executive functioning Social pragmatics	Social communication skills training groups	Group cognitive therapy

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Dislocation of the Knee: Imaging Findings

LCDR Damon Shearer, DO (UMO/DMO);
Laurie Lomasney, MD; Kenneth Pierce, MD

ABSTRACT

Dislocations of the knee are relatively uncommon injuries. However, the incidence of this injury appears to be increasing.^{1,2} Knee dislocations are most often high velocity blunt injuries, with motor vehicle accidents being a frequent etiology. Other causes include falls from height, athletic injuries, farming and industrial accidents, and even low velocity mechanisms such as a misstep into a hole.² Likewise, minor trauma in the morbidly obese is increasingly recognized as a mechanism of knee dislocation.

Multiple forms of dislocation exist, with the common factor being disruption of the tibiofemoral articulation. Dislocation can occur in a variety of directions depending on the mechanism of injury. The most common dislocation is anterior, which may be seen in hyperextension injuries such as martial arts kicking.³ The “dashboard injury” of motor vehicle accidents can result in a posterior dislocation of the knee. Lateral and rotary dislocations are less common.

Knee dislocation is more commonly diagnosed in men, with a mean age of 23 to 31 years old.^{4,6} This is the very patient population encountered by Special Operations Forces (SOF) healthcare providers. Given the mechanisms of injury noted above, it is reasonable to conclude that knee dislocations may be seen in a young, active SOF patient population, particularly those engaged in parachuting, fast-roping/rappelling, driving at high speeds during military operations, and mixed martial arts.

ASSESSMENT

Clinical

Patients with knee dislocation frequently present with multiple traumatic injuries.⁶ A full trauma assessment should be performed on all patients presenting with high velocity knee dislocation, of course observing the tenets of TCCC as the tactical situation dictates. Once life-threatening injuries have been addressed it is critical to assess the affected extremity. Deformity of the affected limb and joint is a sensitive indicator of dislocation; however, many dislocations spontaneously reduce. In these cases, a high index of clinical suspicion is necessary to make the diagnosis and avoid significant morbidity. Dislocation may be suspected based on the history/mechanism of injury, or physical exam findings of joint instability/ligamentous injuries, hemarthrosis, and tenderness to palpation. If available, radiographic examination of the knee is essential. Anterior-posterior and cross table lateral images will document non-reduced dislocations, associated fractures if present, and lipo-hemarthrosis. Obtaining radiographs should never unduly delay reduction of the joint or operative intervention in cases of overt neurovascular compromise.

Dislocation of the knee often results in a multitude of ligamentous injuries. The posterior cruciate ligament (PCL) and anterior cruciate ligament (ACL) are most commonly injured; however, the medial collateral

ligament (MCL) and lateral collateral ligament (LCL) may also be involved. Although these ligamentous injuries are relevant with regard to long-term joint stability, patient mobility, and quality of life, treatment for these injuries is not imperative in acute management.

In addition to associated ligamentous and vascular injuries, neurological compromise has also been documented. Approximately 10 to 25% of patients will present with a concomitant common peroneal nerve palsy, with long-term residual neurological deficits reported in some cases.⁷ Accurate serial documentation of neurological status is vital to assess for potential neurological complications of dislocation.

Fractures about the knee joint also frequently complicate dislocations. In one series, 53% of dislocation had concomitant local fractures.⁶ Fracture patterns vary, but tibial plateau fractures are the most common. Distal femur and combined or isolated fractures of the tibia and fibula are also encountered.

The most worrisome complication of knee dislocation is popliteal artery injury, which occurs in approximately 23% of patients.^{5,6} Vascular injury can have devastating consequences in these individuals, as irreversible ischemia can occur in as little as six to eight hours. Ischemia can result in long-term morbidity or even

amputation of the affected limb. Blunt popliteal artery injury has been reported to result in amputation rates of nearly 30%.⁶ Depending on the degree of injury to the vessel, this diagnosis may be obvious or occult.

Signs of vascular injury are commonly divided into hard and soft findings. *Hard* findings include: pulse deficit, obvious distal ischemia (cyanosis, pallor), active hemorrhage, and expanding or pulsatile hematoma. *Soft* findings include: small/stable hematoma, injury to an anatomically related nerve (such as the common peroneal nerve), and history of hemorrhage at the site.

Frank disruption of the vessel with active hemorrhage may be observed in open fractures. Intimal flaps and defects, pseudoaneurysms, and stenosis may manifest in subtle changes including gradually diminishing pulses, exercise/motion induced ischemia, and a slowly progressive popliteal fossa mass. Therefore, in all suspected knee dislocations, a dedicated neurovascular exam of the lower extremities is required. The following parameters should be assessed immediately after injury: distal pulses (dorsalis pedis and posterior tibial arteries), capillary refill, and distal sensory and motor function.

Those patients with *hard* findings of vascular injury require emergent surgical evaluation for revascularization. Those patients with *soft* findings require measurement of the ankle-brachial index and serial observation for a minimum of 24 hours at regular intervals. It is important to distinguish vascular injury from other possible causes of an abnormal neurovascular exam. Steele et al.⁸ reported a case of popliteal artery injury after dislocation, which was initially treated as compartment syndrome with fasciotomy. This can lead to a delay in definitive vascular repair and may result in limb ischemia.

The ankle-brachial index (ABI) is a method of noninvasive investigation for vascular injury after dislocation of the knee (See figure 1). The ABI is simply a ratio of the posterior tibial/dorsalis pedis/ankle systolic pressure to the brachial/arm systolic pressure. The ABI is most often performed utilizing a small portable ultrasound device, which some SOF units are now fielding (see the article, "Portable Ultrasound Empowers Special Forces Medics" on page 59 in this edition). Alternatively, the ABI can also be performed with a stethoscope and sphygmomanometer. In general terms an ABI of 1.0 is normal. Mills et al.⁹ found that an ABI of 0.90 or higher was 100% accurate in excluding vascular injury. Additionally, they found that an ABI less than 0.90 was 100% sensitive and specific for vascular injury. Other investigators have utilized an ABI of less than 0.80 as marker for vascular injury, with good results when combined with physical exam findings.¹⁰

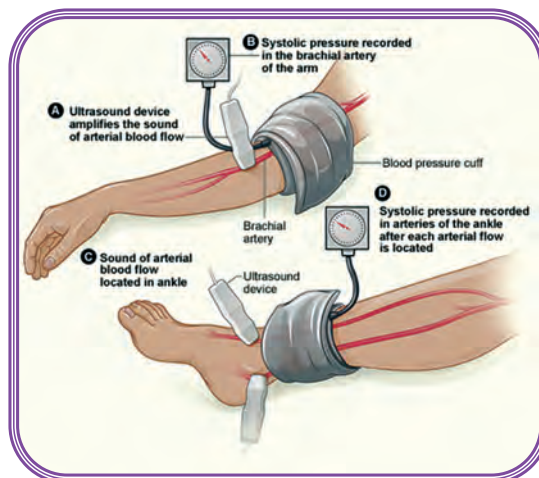


Figure 1: Diagram of ABI assessment. Used with permission from the U.S. National Heart, Lung and Blood Institute

Technique

1. Measure highest systolic brachial pressure in both arms.
 - a) Record first doppler sound as cuff is deflated.
 - b) Use highest of the two arm pressures.
2. Measure systolic readings in both legs with cuff applied to calf.
 - a) Record first doppler sound as cuff is deflated.
 - b) Record dorsalis pedis & posterior tibial pressures.
 - c) Use highest ankle pressure (DP or PT) for each leg.
3. Calculate ratio of each ankle to brachial pressure.

RADIOGRAPHIC FINDINGS

As noted before, standard AP and lateral radiographs are very sensitive for diagnosing non-reduced dislocations. However, as many dislocations undergo spontaneous reduction, secondary radiographic findings may suggest prior dislocation, including fractures about the knee (especially avulsion of the fibular head), hemarthrosis, and asymmetrical joint line widening. These findings should prompt further evaluation.



Figure 2: Cross table lateral and frontal radiographs demonstrate anterior dislocation of the tibia on the femur.

The multitude of ligamentous injuries, which frequently complicate dislocations are best imaged with magnetic resonance imaging. (see Fig. 3A, B, C, D.)



Figures 3:

A. Sagittal MRI demonstrating complete tear of the ACL (black arrow).

B. Sagittal MRI demonstrating complete tear of the PCL (black arrow).

C. Coronal MRI with high signal of lateral and medial collateral ligament tears (black arrows) and bone contusion (gray arrows).

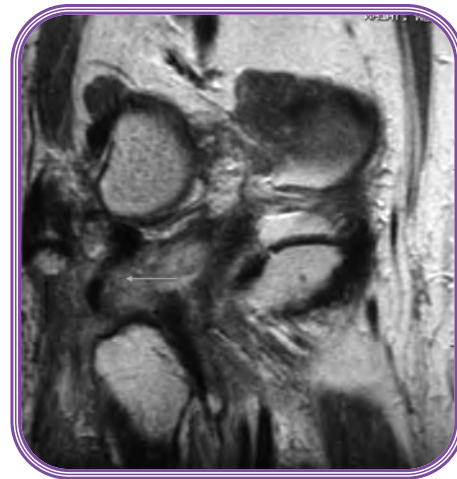


Figure 3:

D. Fibular head avulsion fragment (black arrow) and asymmetric joint line widening (gray arrow).

Arteriography has long been the gold standard for evaluation of vascular injury associated with dislocations of the knee, with some authors arguing that all patients with complete dislocation of the knee undergo arteriography.¹¹ Arteriography may demonstrate a range of vascular injury from minor to severe. Common findings of popliteal artery injury are complete occlusion (see figure 4), intimal injuries (see figure 5) and pseudoaneurysms.

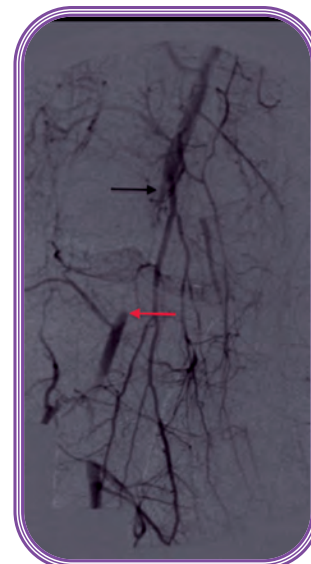


Figure 4: Arteriogram of a reduced knee dislocation.

Abrupt cut-off of the popliteal artery is noted (black arrow). Distal reconstitution is evident (red arrow).

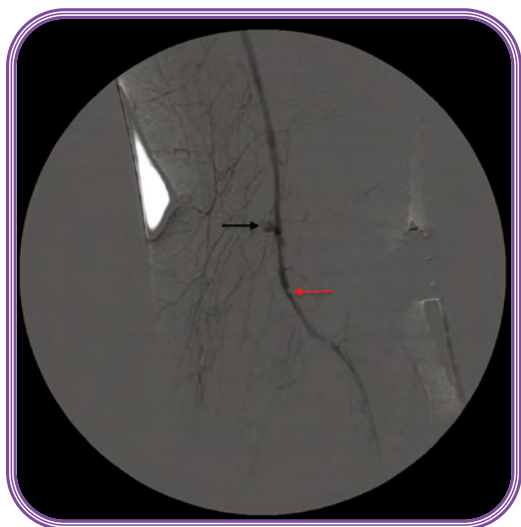


Figure. 5: Arteriogram of a reduced knee dislocation. Contrast extravasation consistent with active hemorrhage (black arrow). Intimal flap of the popliteal artery is also noted (red arrow).

Angiography is an invasive test and obviously may not be available at all medical facilities receiving military casualties. Alternatively, magnetic resonance angiography may also be used to evaluate the popliteal artery. This imaging modality is often times more widely available than a qualified interventional radiologist or vascular surgeon for performance of an arteriogram. Additionally, it is noninvasive. Several retrospective and prospective studies have evaluated the use of the physical exam alone for detecting injury to the popliteal artery. The physical exam findings consistent with vascular injury are diminished or absent distal pulses (posterior tibial and dorsalis pedis), enlarging hematoma, and signs of distal ischemia. Other signs include bruits or thrills over the injured vessel and of course active hemorrhage from an open injury. Evaluation of pedal pulses alone is not adequate for detection of vascular injury. Barnes et al.¹² reported that the sensitivity of abnormal pedal pulses was only 0.79. However, when examination of pedal pulses is combined with evaluation of additional hard findings of vascular injury, the physical examination becomes a potent indicator of vascular trauma. Miranda et al.⁵ reported that a physical exam negative for *hard* findings of vascular injury could obviate the need for arteriography, and allow for 23 hours of observation and serial physical exams. Stannard et al.¹³ reported similar findings, suggesting that forty-eight hours of observation may be necessary in select cases.

TREATMENT

Treatment of knee dislocation is variable and depends on the severity of injury. First and foremost, the joint must be reduced and stabilized. Patients with obvious vascular pathology such as active hemorrhage

or *hard* findings of vascular injury require immediate surgical exploration. Those individuals without signs of vascular injury or with *soft* signs of injury (related nerve damage, stable small hematoma) can be subjected to serial examinations and observation for 24 to 48 hours. An ABI assessment should also be performed if feasible.

Treatment of associated fractures will vary depending upon the nature of the injury. Ligamentous injuries should undergo orthopedic referral and surgical repair as necessary.

CONCLUSION

Disruption of the tibiofemoral articulation is associated with high velocity blunt injuries, such as motor vehicle accidents and falls from height, as well as athletic injuries. Given the nature of SOF operations and activities of SOF personnel, this patient population may be at risk for this form of musculoskeletal trauma. Knee dislocations frequently spontaneously reduce, making the diagnosis difficult. A high index of suspicion is necessary in the appropriate clinical setting. This injury is frequently complicated by vascular injury to the popliteal artery with potential associated severe morbidity. In cases where knee dislocation is suspected by mechanism of injury and/or physical exam findings, a complete trauma assessment is warranted. Dislocation mandates immediate reduction of persistent malalignment, careful assessment of neurovascular status, and immediate CASEVAC for further evaluation and definitive treatment.

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Monkey Bite Exposure Treatment Protocol

COL Frank Newton, MD, MPH

INTRODUCTION

This article reviews immediate first aid measures following a monkey bite, which include rapid, thorough washing of wounds with soap and water, and medical interventions to ensure that our Special Operations Forces (SOF) remain healthy and fit to fight. Monkeys are a common sight in many of the regions to which our SOF deploy to. (*Editor's Note: Areas of northern Africa to eastern Asia would include primarily "Old World" monkeys such as the macaques that are the primary zoonotic reservoir of herpes B virus. In South and Central America, monkeys common in these areas constitute "New World" monkeys that would not naturally harbor the herpes B virus. This would be an important distinction that would dictate appropriate treatment in the field.*)

Monkeys are often quite comfortable around humans and this can lead to some very dangerous disease threats. One recent monkey bite exposure could have ended badly, but the Task Force Surgeon was armed with the protocol you are about to read, and took immediate action.

A servicemember was walking in a low-light area after dark and collided with a tree (It seems that talking on a cell phone is not only dangerous while driving!) A very startled monkey residing in the tree landed on the servicemember's neck and gave him some shallow bites to his neck in the ensuing scuffle.

RISKS OF MONKEY BITES

Monkeys carry many diseases that infect humans. Exposure to monkey violence (bites and scratches) puts one at risk for rabies, which is nearly 100% fatal, the only survivors being those who have received vaccination before the onset of symptoms, and herpes B virus.¹ (*Editor's Note: There has been one non-immunized individual who survived clinical rabies through heroic efforts including long-term hospitalization.*) Herpes B is a very dangerous infection that is quite prevalent in Macaque monkeys.² (*Editor's Note: Tuberculosis is another potential zoonotic disease that is a major concern with close contact with NHPs. Although less likely from a one-time incident than exposure to rabies or herpesviruses, any contact with saliva from monkeys could potentially expose a person.*) Macaques live in many different habitats across the globe, making them the most widely distributed genus of non-human primates. (*Editor's Note: Macaque monkeys may become infected with herpes B, but the infections is uniformly fatal and therefore, these species would not be considered reservoirs for subsequent infection of humans.*)

There are reports of fatal cases in humans of myelitis and hemorrhagic encephalitis from herpes B

following bites, scratches, or eye inoculation of saliva from monkeys.³ Several vendors and tour groups will tell servicemembers that monkeys on the tour shows have been vaccinated for rabies and other viruses, but upon further investigation, there is no documentation or evidence to support these claims. (*Editor's Note: There are no commercially licensed rabies vaccines approved for use in monkeys (at least in the U.S.) so any vaccination claim would likely be invalid.*)

IMMEDIATE FIRST AID, WHICH INCLUDES SELF-AID

Meticulous wound care is important. Thoroughly wash the wound with povidone iodine or chlorhexidine followed by irrigation with sterile saline, or bottled drinking water if sterile saline is unavailable as soon as possible. (*Editor's Note: The latest guidance from the CDC working group for herpes B management [Clinical Infectious Diseases 2002;35:1191–203]⁴ indicates that the initial treatment would be to scrub the wound for at least 15 minutes. As the author also acknowledges that eye inoculation is a possible route of exposure, liberal flushing of the eye as described in the reference above, would also be indicated.*)

POST-EXPOSURE PROTOCOL

Be very vigilant when differentiating between animal scratches and a bite. There may be small punctures that are difficult to appreciate. When in doubt, treat any lesion as a bite since a bite victim **DOES** need post-exposure prophylaxis for rabies. A scratch victim does not need rabies post-exposure prophylaxis – unless monkey saliva has entered the wound. (*Editor's Note: In any area where rabies is endemic, a scratch from an animal that can not be confirmed rabies-free through histology should be treated as a rabies exposure. It is impossible to determine if a scratch has or has not been contaminated with saliva, and very minor wounds can result in a fatal case of rabies. The risk to the servicemember is too great to not treat these wounds aggressively. Likewise, any mucous membrane exposure (eye, mouth, or nose) should be treated as a potential rabies exposure for the same reasons.*)

WOUND MANAGEMENT

1. Closely inspect the wound and debride, or remove any devitalized tissue. Monkey bites tend to be puncture bites so recommend against any closure of the wound with sutures.
2. Let the wound heal by secondary intention.
3. If the bite has deep punctures, recommend prophylactic antibiotics:

- a. Amoxicillin 875/125mg PO twice daily for five days.
 - b. For penicillin allergic patients, use doxycycline 100mg PO twice daily **with** clindamycin 450mg PO three times daily.
4. Ensure the bite victim is up-to-date with his tetanus vaccine.

RABIES PROPHYLAXIS⁵

1. If not previously immunized for rabies, give the following post-exposure prophylaxis:
 - a. Rabies Immune Globulin (RIG) 20IU/kg; infiltrate around the wound as much of the full dose as feasible and give any remaining amount intramuscularly (IM).
 - b. Administer rabies vaccine; 1.0ml IM in the deltoid (not on the same side as the RIG) on days 0, 3, 7, 14 and 28.
2. If the servicemember completed the rabies pre-exposure immunization series, then post-exposure treatment consists of giving two IM doses (1.0ml each) of rabies vaccine into the deltoid muscle. The first is given as soon as possible after exposure, and the second is given three days later.

HERPES B (CERCOPITHECINE HERPES) PROPHYLAXIS^{4,6}

Treatment to prevent herpes B infection requires valacyclovir (Valtrex) 1gm PO every eight hours for fourteen days. Alternatively, acyclovir 800mg PO five times a day for fourteen days can be given if vala-

cyclovir is not available. (*Editor's Note: Common recommendation and procedures approved by our Infectious Disease Department at WRAMC for laboratory exposure to herpes B emphasizes copious flooding of the wound site for at least 15 minutes with water while scrubbing with povidone iodine or other antimicrobial solution. This procedure should be emphasized for all bites/scratches or mechanical wounds potentially contaminated with monkey body fluids. It is potentially effective against any microbial contamination of a wound and is the first line of defense in protecting the servicemember.*)

If the bite victim develops any neurological symptoms in the next few days to five weeks after the bite, he should be referred to a higher level of care for further treatment.

The author would like to acknowledge the contributions of Dr. Kep Davis, M.D., Infectious Disease Staff, Eisenhower Army Medical Center, Fort Gordon, GA.

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Canine Tactical Field Care

Part Three –

Thoracic and Abdominal Trauma

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Part One: Physical Examination and Medical Assessment of the Canine Patient was in Vol 8 Ed 3, Summer 08.

Part Two: Massive Hemorrhage Control and Physiologic Stabilization of the Volume Depleted, Shock-Affected or Heatstroke-Affected Canine Patient was in Vol 9 Ed 2, Spring 09.

Part Four: Gastric Dilatation and Volvulus, Other Gastrointestinal Disturbances and Toxicoses and

Part Five: Common Orthopedic and other Traumatic Injuries will be in upcoming editions of the JSOM.

ABSTRACT

Military and law enforcement agencies have seen a dramatic increase in the utilization of working canines both at home and in foreign deployments. Due to the fact that professional veterinary care is sometimes distant from internal disaster or foreign deployment sites, the military medic, police tactical medic, or other first-response medical care provider may be charged with providing emergency or even basic, non-emergency veterinary care to working canines. (*Editor's Note: Military veterinary detachments are collocated next to the major human treatment facilities in a deployment environment. In a deployed environment veterinary care is located in areas where they are most needed or where most of the animals are located.*) The medical principles involved in treating canines are essentially the same as those for treating humans, but the human healthcare provider needs basic information on canine anatomy and physiology and common emergency conditions in order to provide good basic veterinary care until a higher level of veterinary care can be obtained. This article represents the third in a series of articles designed to provide condensed, basic veterinary information on the medical care of working canines, to include military working dogs (MWDs), police canines, federal agency employed working canines, and search and rescue dogs, to those who are normally charged with tactical or first responder medical care of human patients. This article provides an overview of the diagnosis and treatment of common traumatic injuries to the thorax and abdomen.

BACKGROUND AND PURPOSE

The recent upsurge in the use of working canines as a result of the continuing Overseas Contingency Operation (formerly the Global War on Terror) has resulted in a need for more veterinary healthcare providers in the field setting.¹⁻⁶ The canine is a critical member of the tactical team or the search and rescue team, and it is susceptible to similar injuries and conditions as its human colleagues. Whether deployed overseas in support of military missions or at home in support of terrorism events or natural disasters, working canines may become casualties. In some cases, these canines are injured when definitive veterinary care is not immediately available,^{4,6-9} especially in cases such as natural disasters or small distantly deployed units where it is simply not feasible to have a veterinarian on site with each canine team. Professional veterinary care may be hours to days away from the location of the injured canine, and providing veterinary care frequently falls to the dog handler, combat medic, or other human healthcare provider.^{4,6-9} For this rea-

son, it is critical that non-veterinary healthcare providers be trained in basic veterinary medical skills to allow them to stabilize a critically injured working canine in the field in order to safely transport to definitive veterinary care, therefore enabling a more expeditious return to duty.

(*Editor's Note: Veterinary personnel have been located in 15 to 17 different locations in Iraq during 07-09. If kinetic force was planned for a certain area, they moved a jump team in that area to cover expected injuries. This jump team included a veterinarian. Downrange commanders state that "With over 650 dogs in theater, it is true that there can never be a veterinarian with each team, even SOF doesn't provide this to their teams. However, engineer MDD units have slots for one 68T/6 teams. OIF currently has eight vet clinics and two additional sites with 68Ts available 24/7. Therefore, first-responder care has been integrated into handler training for the past five years and, although transport to definitive vet care is necessary, catastrophic wounding certainly does not occur at a rate that exceeds our capacity."*)

The purpose of this article is to introduce and familiarize the tactical medic and other human healthcare providers with some of the more common canine thoracic and abdominal conditions experienced in traumatic injuries. The article presents radiographs of normal canine anatomy (Figs. 1 and 2) for illustration, and includes radiographs of some pathological conditions for discussion and illustration of the anatomical and physiological abnormalities associated with canine trauma (Figs. 3-10). It discusses assessment and treatment of these conditions. It is beyond the scope of this article to instruct in the complete diagnosis of abdominal and thoracic trauma versus differential conditions. However, by studying this overview, the reader with general knowledge of emergency medicine and surgery should be able to familiarize himself with these conditions and perform early medical assessment of the canine trauma patient⁹. (*Editor's Note: Part of the purpose of this article is to familiarize physician / surgeons with canine care in the event they are called upon to provide emergency care to a working dog in the absence of a licensed veterinarian. As stated in the article, this absence of professional veterinary care may last for days, and in such an instance it is theoretically possible that a physician surgeon could be called upon to serve as a veterinarian and provide diagnosis and surgical care.*) It is the express purpose of this article to provide some baseline veterinary guidance to human healthcare providers who may be forced to perform these interventions in the absence of direct veterinary participation. In some instances, radiology and surgery could be feasible to save the life of a canine prior to the availability of professional veterinary help.

As mentioned in prior articles in this series, it is critical for the care provider to ensure a safe treatment environment by placing a muzzle on the canine patient prior to any treatment attempts.^{8,10} (*Editor's Note: One critical thing that needs to be mentioned is to be aware of where the closest veterinary facility/hospital to your location is and to establish phone contacts with that veterinarian in case of emergency. That will be a major tool in the preparation of canine emergency care and the survival of a critically injured patient. There are times that dogs have been operated on or emergency procedures conducted because it was something they felt they could do, but they are not licensed to do them, and in fact, a veterinarian was only five or ten minutes away. It should be emphasized that if a veterinarian is not on site, then after initial stabilization, or sometime during stabilization, all efforts should be made to contact a veterinarian for further recommendations. Most veterinarians are a phone call away, but of course in a combat situation, communication would be limited. If you are anywhere by radiograph equipment, a phone should be available.*)

THORACIC TRAUMA

Thoracic trauma is commonly encountered as a result of both blunt and penetrating injury. In the military and police operational environment, penetrating in-

juries to the thorax from ballistic wounds and explosions are relatively high incidence injuries.^{6,9} Ballistic wounds account for approximately half of the life-threatening or fatal wounds incurred by military working dogs in Afghanistan and Iraq, with explosive blast injuries accounting for the majority of the other half.⁹

Wounds to the thorax from any cause (in relation to wounds to other parts of the body) appear to be more common in canines than in human servicemembers.⁹ Pneumothorax, hemothorax, pulmonary contusion, diaphragmatic rupture, and rib fractures are among the thoracic injuries in working and non-working canines.^{9,11}

Physical examination findings from the canine patient can provide important clues as to the nature of the thoracic injury. A primary visual and palpation survey of the chest and neck will immediately reveal external evidence of trauma in flail chest, sucking chest wound, and massive external hemorrhage cases, but some penetrating injuries will present with small, minimally bleeding wounds that are only detectable after the chest has been shaved.¹³ The heart and lungs should be auscultated and the rate and quality of heart and lung sounds in all quadrants of the thorax should be assessed.

The clinician should note and monitor respiratory rate, pattern, and effort every few minutes over the treatment period. For comparison, Table 1 presents normal physiological parameters for the working canine.

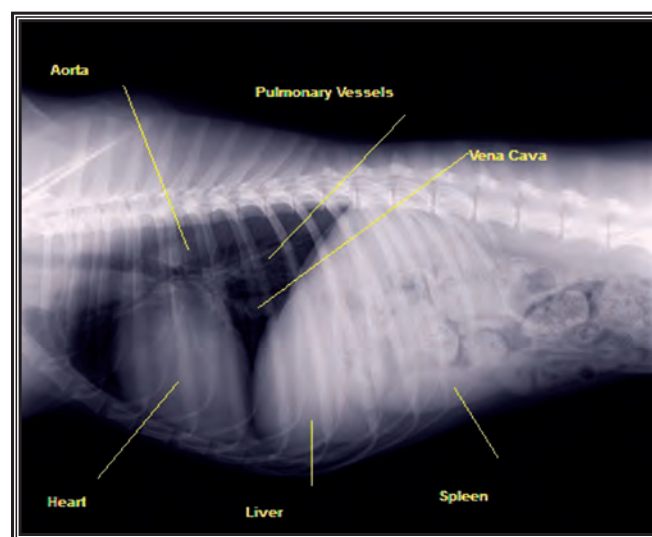


Figure 1

NORMAL ANATOMY

The thoracic cavity in the canine patient occupies the cranial 40-50% of the dogs' trunk between the thoracic limbs and the pelvic limbs (Fig. 1). There are 13 ribs in the canine patient, with the first 12 ribs being attached to the sternum via cartilaginous extensions and the 13th rib "floating" free of sternal attachment. The diaphragm separates the abdominal cavity from the thoracic cavity as it does in the human patient, coursing diagonally dorso-caudal from its ventral attachment to

the sternum at approximately the 7th rib to its tapered tips at the 12th to 13th rib, with the crura extending to their dorsal attachments at the L3-L4. The heart occupies the ventral 60-70% of this space, from approximately the 4th to the 7th rib; it sits with its apex against the sternum and the base positioned dorsally and tilted slightly cranial. When viewed from a ventro-dorsal orientation, the heart is positioned in the center of the thorax, abutting the diaphragm, with a normal “bulge” representing the right atrium protruding cranio-laterally (Fig. 2). The mediastinum is visible cranial to the heart on radiographs (Figs. 1 and 2) and is usually approximately one-third the width of the cardiac silhouette.



Figure 2

All dogs have a relatively V-shaped thorax when viewed from the head or tail, with the dorsal aspect of the rib cage being substantially wider than the ventral aspect. However, this anatomical shape is particularly pronounced in “deep-chested” dogs, such as German Shepherds and large-framed Labrador Retrievers, and is thus the common thoracic anatomy in most military and police working dogs. The lungs are predominantly situated in the dorsal 50% of the thoracic cavity, with thinning points of the lung lobes extending ventrally into the space between the heart, mediastinum, and ribs. Because the lungs have significantly more available volume in the dorsal aspect of the thorax, the sternal position (standing or sitting sternally), where the lungs can float dorsally upon thoracic fluid or displaced organs, is most comfortable for canines experiencing respiratory distress. The pulmonary vasculature is normally visible radiographically in each quadrant of the thorax (Figs. 1 and 2).

PNEUMOTHORAX

Pneumothorax, or air in the pleural space, occurs commonly secondary to thoracic trauma. Two types of pneumothorax are recognized: pneumothorax and tension pneumothorax. Pneumothorax (non-tension)

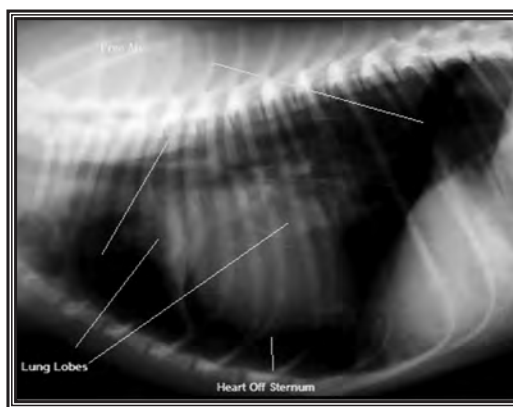


Figure 3

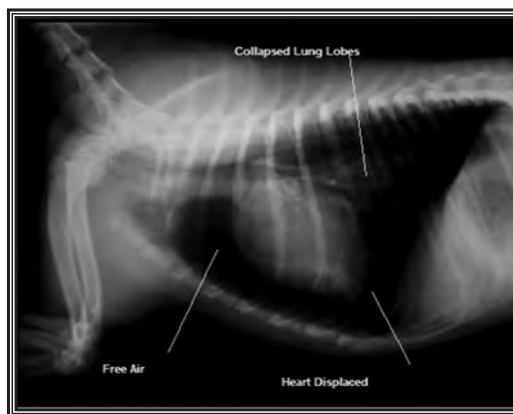


Figure 4

occurs in instances where air enters the pleural space during inspiration, but the air is able to escape the chest, such as through a traumatic hole in the thoracic wall (sucking chest wound) during expiration. Tension pneumothorax is generally the result of sharp penetrating trauma, where intrathoracic pressure increases with inspiration, but the air brought into the thoracic cavity cannot escape in expiration.¹²

In cases of pneumothorax or open pneumothorax, diagnosis is based upon physical exam findings and radiographs where available. Auscultation of the thorax typically reveals quiet or absent lung sounds relative to the degree of respiratory effort. (*Editor's Note: Muffled heart sounds should also be included in auscultative abnormalities, as well as characteristics of the breathing pattern [rapid shallow, restrictive].*) The practitioner may notice open wounds to the thorax, including severely displaced rib fractures or open wounds in the intercostal spaces. Signs of pneumothorax on thoracic radiographs include a cardiac silhouette that is raised off of the sternum, collapsed lung lobes, free air in the pleural space (Figs. 3 and 4), and loss of pulmonary vascular markings near the periphery (Figs. 5 and 6). Initial treatment of the open pneumothorax includes cleaning and disinfection of the wound and placement of an air-impermeable bandage or chest seal over the wound. It is the author's observation that the hair on the canine thorax can make chest seal placement difficult, but seals can be held in place by circumferential

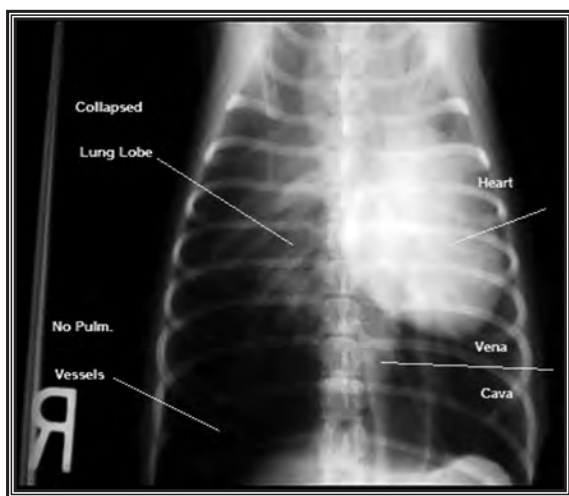


Figure 5



Figure 6

bandaging around the thorax. It is important for the care provider to remember two potential complications of chest bandaging: restriction of respiratory ability and the potential for creation of a tension pneumothorax in trauma patients.¹³ Positioning of the patient is as important in canine thoracic injuries as it is in humans. Canine patients with respiratory difficulty are usually most comfortable sitting or standing in a sternal position, with the dorso-ventral axis of the dog perpendicular to the ground.^{11,12}

Tension pneumothorax results in a patient who may or may not have obviously significant thoracic wounds, but who expresses progressively deteriorating respiratory distress. As pressure increases in the affected hemithorax, the mediastinum along with the heart and great vessels is displaced toward the opposite hemithorax. This displacement is visible radiographically (Figs. 5 and 6). Physical examination findings include any evidence of trauma to the chest (or possible trauma), progressively deteriorating cardiovascular status as heart function, deteriorating respiratory distress,

and diminishing to absent lung sounds on the affected side. Diagnosis can be confirmed in the field by the preferred presumptive treatment: placement of a 14 gauge needle or IV catheter into the affected hemithorax. In the canine patient, the catheter should be passed intercostally in the 7th to 9th rib spaces of the dorsal one-third of the thorax, with the needle oriented perpendicular to the skin and pointing toward the opposite hemithorax.^{11,12}

It is important for the canine emergency care provider to recognize that the clinical signs of tension pneumothorax (increasing respiratory distress, cardiovascular collapse) can be very similar to those of gastric dilatation and volvulus (GDV) in the working canine. This occurs as a result of similar underlying physiological abnormalities including diminished hemodynamic return via the great veins and reduction of the available lung volume by expanding pressure in the thoracic cavity. These two conditions can be distinguished clinically by the continuance of lungs sounds in both hemithoraces in GDV patients and by the palpable presence of the air-distended stomach in the abdomen.

Treatment of pneumothorax varies according to severity. In cases of penetrating trauma to the thorax, radiographic evaluation is indicated as soon as feasible. Sucking chest wounds, penetrating injuries to the chest, and some cases of closed pneumothorax will require emergency surgical thoracotomy and repair.^{11,12}

FLAIL CHEST

Flail chest is a condition in which individual ribs are broken in at least two places, resulting in a panel of chest wall that moves paradoxically (moving in on inspiration and out on expiration) during the breathing cycle.¹⁴ Medical management of flail chest includes placing the dog in lateral recumbency with the injured (flail segment) side down and bandaging as indicated. Surgical repair is eventually indicated in these cases,¹⁴ but for patients who are stable and have no concurrent pneumothorax or hemothorax, this repair should be delayed until professional veterinary surgical care is available.

PULMONARY CONTUSION

Pulmonary contusion is one of the most common complications of thoracic trauma, and can range in severity from mild to life threatening. Radiographic evidence of pulmonary contusion can range from interstitial to severe alveolar pulmonary patterns. Harsh lung sounds are often auscultated on physical examination. Treatment for pulmonary contusion varies according to severity. In mild cases of pulmonary contusion no specific treatment is required. More severely affected patients may require oxygen support and in some cases, mechanical ventilation. As in all trauma patients, treatment for shock should be initiated immediately to restore perfusion. However, in the presence of pulmonary contusion, aggressive fluid therapy may lead to worsening of

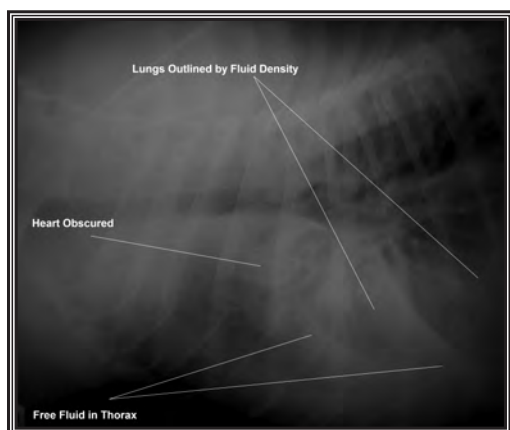


Figure 7

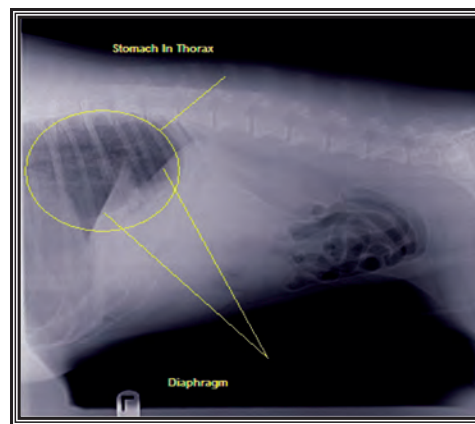


Figure 8

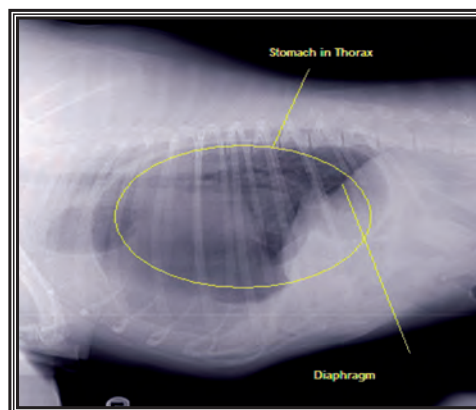


Figure 9

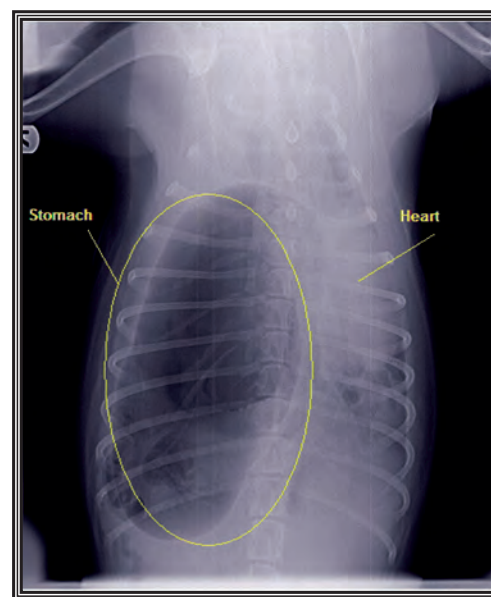


Figure 10

the respiratory status and excessive fluid administration should be avoided. Pulmonary contusion may worsen in the first 24 to 48 hours following a traumatic event and resolves over four to seven days. The presence of pulmonary contusion does not automatically warrant antibiotic therapy, and diuretics are generally not indicated.^{11,14}

HEMOTHORAX

Hemothorax will result in changes in cardiac and pulmonary physiology that are detectable on physical examination. As blood starts to accumulate in the thoracic cavity, it will go to the most dependent part of the chest, which is the ventral thorax on a dog sitting sternally or standing. Fluid in the thoracic cavity can muffle heart and lung sounds and the care provider might be able to detect a fluid line via auscultation of lung sounds and percussion (tapping while auscultating) of the thorax. As blood loss into the thoracic cavity increases, the canine will begin to exhibit clinical signs of blood loss, but without the clinical evidence of bleeding. Thus, signs of cardiovascular shock and blood loss with a rising fluid line are the clinical diagnostic indicators of hemothorax. When plain radiographs are available, the care provider will find evidence of pleural fluid in the ventral aspect of the thorax and obscuring of the cardiac silhouette on lateral views (Fig. 7) and the caudal and lateral aspects of the thorax on ventro-dorsal views. (*Editor's Note: Thoracocentesis would also be diagnostic and therapeutic in these cases. Diagnosis of worsening hemothorax is an indicator for immediate emergency exploratory thoracotomy.*^{11,12})

DIAPHRAGMATIC RUPTURE / HERNIA

Diaphragmatic rupture or hernia is not an uncommon result of thoracic and / or abdominal trauma in the canine patient. Displacement of part of or entire abdominal organs is common in large diaphragmatic hernias, including potential displacement of intestines, stomach, spleen, liver, omentum, or kidney(s). Small diaphragmatic ruptures can be difficult to diagnose clinically as they do not always result in the typical clinical

signs of respiratory distress, abdominal splinting and pain, and vomiting or diarrhea. Displacement of the entire stomach into the thorax can result in gas distension of the stomach within the thoracic cavity and clinical mimicry of a tension pneumothorax (Figs. 8, 9, and 10). In many cases, radiographs are required for diagnosis of the canine diaphragmatic trauma. Emergency surgical repair of the hernia and associated pathology is indicated in diaphragmatic trauma cases.^{11,12} (*Editor's Note: Emergent repair required for gastric displacement. Di-*

aphragmatic hernias have a higher morbidity and mortality if surgical intervention is performed within 24 hours of the trauma. Gastric displacement although emergent should not be performed until the dog is stable, but monitoring for acute gastric distention is imperative.)

INSTRUMENTED ASSESSMENT

Oxygenation and ventilation status are ideally evaluated using an arterial blood gas, and pulse oximetry can provide some information relative to oxygenation. Pulse oximeter probes are best applied to the tongue, ear, lips, toe-web, prepuce, or vulva of the canine patient.

Thoracic injuries frequently result in shock. Treatment for shock should be initiated as soon as it is identified.^{10,11,15} Treatment of shock in the canine patient was covered in the second article in this series.¹⁰ Pain secondary to thoracic trauma may restrict the canine patients' respiratory function and appropriate pain treatment should always be provided.^{4,6,7,8,10} Treatment of significant blood loss (HCT < 15) requires transfusion of either a canine artificial blood substitute (Oxyglobin)^{10,16} or whole canine blood.^{10,16} (**Editor's Note:** *Many working dogs' hematocrits are higher than the normal canine. Treatment should be based upon clinical signs and hemodynamic stability versus a strict number.*) It is important to remember that Oxyglobin provides oxygen carrying capacity and osmotic stability, but does not provide normal blood proteins and clotting factors.¹⁶ (**Editorial Note:** *Oxyglobin is approved for use in dogs by the FDA and it is commonly used in veterinary ERs around the country. However, currently very limited supplies exist and it is important to note that there are conflicting opinions/articles. There may be significant hemodynamic effects – potentially adverse – with the use of hemoglobin solutions causing consequences to later diagnostics until the hemoglobin is cleared. However, it is the author's professional experience Oxyglobin is a valuable tool [see references].*)

THORACIC TRAUMA SUMMARY

Flail chest, pulmonary contusion, pneumothorax, open chest wounds, hemothorax, and diaphragmatic rupture are common secondary to thoracic trauma.^{11,12} Thoracic wounds should be explored and wounds that penetrate the thoracic cavity warrant a thoracotomy to explore the chest for further injury. Pain management including injectable analgesics as well as local anesthetic blocks are important aspects of treatment of thoracic injury. Management of thoracic injury involves treatment for shock and assessment of oxygenation and ventilation. Intubation and manual ventilation should be performed when respiratory distress persists despite oxygen supplementation. Mechanical ventilation until surgical intervention is available may be required in cases of oxygenation or ventilatory failure.^{9,11,12,14}

ABDOMINAL TRAUMA

The principles surrounding the initial approach to the patient with abdominal trauma are similar to those in a patient that has sustained any form of trauma. The clinician should perform a general overall physical that initially avoids the abdomen to avoid eliciting significant pain or vagal response.¹⁸ Rapid assessment of the cardiovascular and respiratory systems should be performed, and the patient should be evaluated for clinical signs of shock.¹¹ If physical examination findings are supportive of shock (e.g., tachycardia, pale mucous membranes, poor pulse quality), then a large bore intravenous catheter should be placed and fluid therapy should be initiated promptly as described previously.^{4,10,11,18}

Once any necessary treatment for shock has been initiated, then a second, more thorough physical examination should be performed. The examination of the abdomen itself should include visual inspection, auscultation, percussion, ballottement, superficial and deep palpation, and digital rectal examination.¹⁸ In some instances the presence of abdominal trauma may be easily identified with physical examination alone (especially when external wounds are present).

The presence of wounds or bruising over the abdomen should alert the care provider to the potential for internal injuries. Abdominal distension may indicate the presence of a hemo-abdomen or uro-abdomen or gastric dilatation and volvulus. Abdominal pain, while a non-specific finding, may be an early indicator of abdominal trauma. Bruising or swelling in the caudal inguinal area can be associated with urinary tract rupture. A soft fluctuant swelling under the skin may be indicative of a body wall hernia.

GUNSHOT WOUNDS

Injuries associated with gunshot wounds frequently involve penetrating trauma to the abdomen. Physical examination findings often include bruising as well as ballistic entry and sometimes exit wounds. It is often necessary to shave the hair over the abdomen to identify small ballistic wounds.⁹

In the event a wound is identified that penetrates the abdomen, then an exploratory laparotomy should be performed to rule out injuries to internal organs. The potential for internal injuries resulting from ballistic wounds should not be underestimated, and include punctured bowel, avulsed renal vessels, and urinary tract rupture. However, in a field environment, initial treatment should consist of irrigation and replacement of any eviscerated bowel or other organs, followed by bandaging of the wound. Antibiotic therapy is indicated in all dogs that have sustained gunshot wounds.^{9,18,19}

BLAST INJURY

Blast injuries are the second most common cause of thoracoabdominal trauma in the working canine⁹ and blast injury to the abdomen results in wounds similar to that of vehicular trauma in the general canine population. Wounds sustained from these compressive force injuries are often extensive and extend into the inguinal region.^{18,19}

In all cases where the clinician develops evidence of abdominal trauma, once cardiovascular stability has been achieved, the patient should undergo abdominocentesis, or exploratory laparotomy. Injury to the biliary tree, gallbladder, or liver can result in the expression of bile into the abdomen. Injury to the kidneys, ureters, bladder, prostate, or urethra can result in urine in the abdomen. The presence of bile or urine in the abdominal cavity causes an inflammatory reaction leading to peritonitis, which may or may not be septic. Injury to the gastrointestinal tract can result in feces and bacteria in the abdomen and septic peritonitis. When abdominocentesis reveals evidence of inflammation, bile, urine, feces, or bacteria, an exploratory laparotomy is indicated. Surgical management is warranted in the patient with bile or urine peritonitis.^{18,19}

HEMOABDOMEN

Injury to any abdominal organ can result in hemoabdomen.¹⁹ Significant abdominal bleeding will result in worsening cardiovascular status over time despite appropriate treatment of shock. When large volumes of blood enter the abdomen, the abdomen may distend and become firm on palpation in every quadrant. Abdominal distension, combined with worsening cardiovascular status, may require the need for immediate emergency exploratory laparotomy. (*Editor's Note: Abdominocentesis is a quick technique to help diagnose and differentiate the causes of a fluid wave.*)

Canine patients that experience vehicular or blast trauma should undergo portable ultrasound or radiographic examination of the thorax and abdomen as soon as possible and in advance of exploratory laparotomy where possible. (*Editor's Note: It is worth reiterating the need for stabilization prior to any anesthetic event.*)

Other uncommon sequelae of abdominal trauma include infarction of renal, splenic, or other vessels, and avulsion of mesenteric vessels. Infarction of major vessels, for example the splenic vein, may lead to necrosis and septic peritonitis. Avulsion of mesenteric vessels, while not causing substantial blood loss, leads to segmental bowel necrosis three to seven days following a traumatic event. Since these injuries may not be recognized immediately, the development of lethargy, anorexia, vomiting, or fever a few days or a few weeks

following trauma warrants re-evaluation of the patient, or reconsideration of abdominal trauma in a canine patient with history of recent traumatic wounds.^{11,19}

Canines with abdominal trauma should be evaluated for thoracic trauma. Penetrating injury to either body cavity should be a clinical indication to monitor the other major body cavity, as well as the cardiovascular, pulmonary, and central nervous system very closely until the patient fully recovers.

ABDOMINAL TRAUMA SUMMARY

Immediate assessment and stabilization of major body systems including the cardiovascular system, the respiratory system, and the central nervous system should be performed in the patient with abdominal trauma.^{18,19} Any wound located over the abdominal area should be explored, and an exploratory laparotomy should be performed in any patient with a wound that penetrates into the abdominal cavity. However, medical management of the patient with a traumatic abdominal injury is often possible and should be performed initially until professional veterinary care can be provided. Surgical exploration should not be performed until cardiovascular stability and adequate perfusion has been restored, or if hemodynamic instability persists despite aggressive efforts at resuscitation.^{18,19}

Abdominal injuries secondary to traumatic events can be manifested immediately or several days following trauma. Lethargy, inappetence, or vomiting three to seven days following a traumatic event should alert the clinician to the possibility of internal injuries including devitalized bowel or bile duct rupture and should be evaluated immediately.¹⁹

SUMMARY

Thoracic and abdominal injuries are among the most common causes of morbidity and mortality in military working dogs and police dogs.^{4,6,7,9} The distribution of wounds is different in the canine patient population than in the human patient population, but the assessment procedures and medical and surgical management of these wounds are very similar.⁹ Although gunshot wounds and blast injuries are responsible for the majority of thoracic and abdominal trauma, military and other tactical medical personnel are well trained in the provision of medical care to these types of injuries in the operational environment.^{4,9} By familiarizing themselves with the basic principles of veterinary medical and surgical care of working canines provided in this series of articles, human medical providers can provide appropriate and timely pre-veterinary hospital medical care to the canine patient.

Table 1. Canine Field Care Card

Parameter	At Rest	Exercise	Drug Dose	Standard Dose	CV Shock Dose
Temp.	100.5-101.5	101.0-104	Crystalloids	2.0-3 L / 24hr	10-50 ml/kg/hr * (Accepted shock dose of crystalloids is 90 ml/kg/hr, given in 1/4 dose boluses, to effect)
Heart Rate	60-75	75-130	Hespan (6% hetastarch)	n/a	5-10 ml/kg, up to 20 ml/kg/day
Resp. Rate	10-20	30-panting	Morphine	0.5 - 2 mg/kg IM	n/a
Mucus mm	Pink	Bright pink	Diphenhydramine	1 mg/lb q 6-8 hrs	n/a
CRT	1-2 secs.	1 sec	Diazepam	0.1-0.15 mg/lb slow IV	Seizures: 0.5 mg/lb IV bolus to effect
Pulses	Moderate	Bounding	Fentanyl	0.004-0.01 mg/kg (4-10 mcg/kg) IV bolus and then 0.001-0.004 mg/kg/hour (4-10 mcg/kg/hour) constant rate IV infusion	n/a
Heart Sounds	Behind left shoulder	Sinus arrhythmia except after exercise	Water	Maintenance 2.0-3 L / 24hr	Exercise 5-15 L / 24hr
Resp Sounds	Caudal 1/3 of thorax	Louder than human	Food	Maintenance 4-6 cups dry / 24hr	Exercise 8cups / 24hr

Table 1 contains normal physiological parameters and physical exam findings for working canines in the weight range of 85 to 110 lbs. **Editor's Note:** The majority of MWDs are in the 65-85 pound weight range. Female Malinois are often 5-8 pounds lighter/smaller. The drug doses denoted with an asterisk are from the "Shock" article in the textbook *"The 5-Minute Veterinary Consult."*²² Other values are condensed and edited from articles referenced herein and are consistent with those used by this author in private practice on working canines.^{4,8,15,20,21,23,24} This card may be photocopied and laminated for the use of individual JSOM subscribers.

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Dr. Wesley M. Taylor holds degrees from Rice University (BA 1988) and Texas A&M University (DVM) and is a Diplomate of The American College of Laboratory Animal Medicine. He served as the Assistant Director of Laboratory Animal Medicine at the University of Mississippi Medical Center and as the Chairman of Primate Medicine and Surgery at the New England National Primate Research Center, Harvard Medical School. During this time, he also served as an officer in the Mississippi Air National Guard. For the last 10 years, Dr. Taylor has been in private practice in the north Texas area, where he practices general and emergency veterinary medicine and surgery, and serves as a veterinary consultant at the Texas Research and Education Institute (TREI) and the University of North Texas Medical Center. Dr. Taylor has over 16 years of experience with working canines and lectures frequently to law enforcement groups on emergency medicine and surgery of the canine officer, and he serves as a veterinary consultant to several Texas area law enforcement agencies. Dr. Taylor serves as veterinarian and instructor in TCCC training courses for the Asymmetric Combat Institute, Advanced Medical Training and the Operational Medicine Fund of the Presbyterian Healthcare Foundation.

Portable Ultrasound Empowers Special Forces Medics

SSgt Jeremy D. Crisp

3rd Special Forces Group (Airborne) Public Affairs Office

FORT BRAGG, NC – In the summer of 2007, when MAJ Andrew Morgan, MD, became the battalion surgeon for 1st Battalion, 3rd Special Forces Group (Airborne), he already knew the value of ultrasound machines from being an emergency physician at Womack Army Medical Center at Fort Bragg.

He and his staff realized a deficiency in the arena of medical imaging after they reviewed the medical capabilities of the battalion's Special Forces operational detachment alpha (ODA) teams. So he pushed to acquire more ultrasound machines in order to get them to the Special Forces medics in the field where they would have the greatest impact.

The machines, which use high-frequency sound waves to look into the body for a variety of medical purposes, such as identifying blood in the abdomen, finding fractures, skin infections, and collapsed lungs, already have widespread use in Army medicine, but until recently, were not extensively utilized in the Special Forces arena.

With the advent of portable ultrasound machines, which can weigh less than five pounds, Special Forces medics are realizing the power of this technology in their environment.

Currently, each Special Forces battalion is authorized a single portable ultrasound machine, but when Morgan took his current position, he requested more machines to put in the hands of the unit's medics. He argued there was a "lack of practical imaging on the battlefield" and, in his eyes, one portable ultrasound wasn't sufficient for training or operational employment.

So Morgan proposed an idea to the Command Surgeon at the United States Army Special Forces Command (USASFC), then COL Peter Benson, that if his battalion was authorized more portable ultrasound machines, they would be put to good use. He would give a detailed report to USASFC on how the machines were used by medics in the field. His proof would come in the form of numbers.

Major Morgan, SFC David Hubler, the 1st Bn senior medic, and CPT William N. Vasios, physician assistant for 1st Bn, spent more than a year training 26 Special Forces medics to use the machines, and in Jan-

uary 2009, the battalion deployed to Afghanistan with nine portable ultrasound machines to put to the test in a combat zone.

"The concept of putting portable ultrasound machines in the hands of our 18Ds (Special Forces medics) is something I'm very excited about," Morgan said. "Ultrasound has been around for years, but the novelty in our concept is empowering medics, in addition to medical officers." Battalion medics collected hundreds of images from exams from their deployment to use for documentation and to characterize how Special Forces medics employed their new skill.

Along with their newly acquired capability to use ultrasound in the field, the battalion also had X-ray at their disposal; however, Morgan said the contrast between the two systems could not be greater when it comes to portability and practicality.

Although each Special Forces battalion has one portable X-ray system, the size of the machine made it impractical to use in remote combat environments. "It would take one-third of a Chinook helicopter to get an X-ray machine out to a fire base," Hubler said.

This is in stark contrast with the currently-fielded portable ultrasound machine's ability to fit inside a standard-size medical aid bag. Therefore, the medics of 1st Bn took full advantage of portable ultrasound on the battlefield.

"We were interested to find that the Special Forces medics found it practical not only for trauma, but also routine medical care of their teammates and host nationals," Morgan said.

One ODA medic returning from this recent deployment said he was initially apprehensive to use portable ultrasound. SFC Robert Lopez envisioned a lengthy learning curve and thought portable ultrasound's use was more for pregnancy than for battlefield injuries. However, learning to use the machine took less time than he thought and his feelings of apprehension quickly subsided after he used it for the first time.

As a Special Forces medic with 1st Bn, Lopez was a beneficiary of the training organized by Morgan and his staff, and on their recent deployment he ran a remote firebase clinic where his machine saw prolific use. He described several stories of his practical use of

portable ultrasound to a large crowd of physicians and medics during the Special Operations Medical Association (SOMA) annual conference in Tampa, FL. But it was the story of the first time he put his training to the test downrange that had the audience captivated.

Early in 2009, Lopez thought he was going to have an easy day at his remote clinic when a local national came in with a pain in his hand. Lopez didn't notice anything out of the ordinary with the patient's hand, so he said he gave the man some pain medicine and told him that if it still hurt to come back later. Four hours later the local national was back.

"It was then that I looked behind me and saw the ultrasound machine," Lopez said. He decided to put his training to work. Lopez conducted an evaluation of the patient's hand using the portable ultrasound machine and found a foreign body: A piece of shrapnel from a blast at a trash pit some time back.

Lopez was able to consult with one of his doctors several hours away by describing what he saw on the ultrasound. The doctor confirmed the patient did indeed have a foreign body in his hand. In a matter of five to ten minutes Lopez was able to remove the shrapnel. "My ability to find the foreign body and remove it gave the patient a lot of confidence in my abilities," Lopez said. "And it gave me a lot of confidence in using the ultrasound machine."

Up to a 100 patients a day came through Lopez's clinic, and by the end of the rotation, he said "if patients came in and I didn't use the ultrasound, they thought I didn't care about them." But it took some time for an ultrasound machine to find its way to Lopez's hands.

Portable ultrasound in Special Forces actually had its beginnings in 2003 when the groups received their initial fielding. Upgraded machines were added 18 months ago, and only recently did demand mount for more widespread fielding, said LTC Andrew Landers, current command surgeon at USASFC.

"I have always been a big proponent of ultrasound, but we needed some data to support the use, and to look at training issues," Landers said. Morgan provided that data, as well as a model training program. He and several other medical practitioners devised a program they dubbed Special Operator-Level Clinical Ultrasound, or SOLCUS, which they loosely based off guidelines given for training emergency physicians by the American College of Emergency Physicians.

Morgan said he intends for the training program to spread and bring ultrasound capability to all types of Special Operations units. Those intentions moved forward on 13 December 2009 when he briefed his two-year experience with training and applying ultrasound in the Special Forces environment at the SOMA Conference. He, along with Lopez and Hubler, also briefed their personal accounts of success with ultrasound and demonstrated the value of the equipment to physicians and medics from across the world.

In attendance were Special Operations medical professionals from allied nations, civilian government agencies such as NASA, physicians, and physician assistants from various specialties, and Special Operations medics from every branch of the U.S. Armed Forces. They were immersed in eight hours of lessons learned and practical training on the portable machines. The audience also heard some of the technical aspects of why Morgan had such a passion about ultrasound.

Portable ultrasound machines offer capabilities such as being able to save images as jpg files, as well as recording live video of procedures in which they are used. These can then be downloaded through USB ports on the machines. The machines can see nerve bundles to help in local anesthesia, as well as showing clear pictures of veins to guide medics when drawing blood or giving fluids intravenously.

They operate off a standard Operators' radio battery or can be plugged into a 110-volt power source with a continuous run-time of two hours. They are roughly \$40,000, a third of the cost of a portable X-ray machine, and have a much greater diversity of functions than X-ray. This makes portable ultrasound a more viable financial option and a more powerful clinical tool for the groups, Morgan said.

"Using portable ultrasound in theater is a kind of like the guy who first decided to put a lid on a coffee cup – it just made sense," Vasios said. "So we used it, and we proved it."

With these factors in mind, the medical staff of 1st Bn and LTC Landers continue to work to get more portable ultrasound machines in the hands of those they feel need them most: The Special Forces medic. "The plan is to increase the program to all the groups in a phased approach," Landers said. "The key is training and maintaining the skills required to operate and use the machines."



MAJ Andrew Morgan, MD (right), battalion surgeon, 1st Bn, 3rd SFG (A), explains some of the functions of a portable ultrasound machine to SFC Kevin Burkett, medic, 1st Bn, while SFC Steven Radloff, medic, 1st Bn, looks on during the SOMA's annual conference 15 December in Tampa, FL. Morgan and his office have been pushing to get more portable ultrasound machines, as well as practical training, in the hands of Special Forces medics in order to help empower them on the battlefield. (U.S. Army photo by SSG Jeremy D. Crisp/ 3rd SFG(A)).



SFC David Hubler, senior medic, 1st Bn, 3rd SFG(A), practices placing a syringe in a vein on a training device while using a portable ultrasound machine for guidance during the SOMA's annual conference 15 December in Tampa, FL. Ultrasound can see patient's veins as well as a syringe entering an area, which helps ensure the needle is put in the right place. (U.S. Army photo by SSG Jeremy D. Crisp/ 3rd SFG (A)).



SFC David Hubler (left), senior medic, 1st Bn, 3rd SFG (A), practices placing a syringe in a vein on a training device while MAJ Andrew Morgan, MD, battalion surgeon, 1st Bn, 3rd SFG, looks on during the SOMA's annual conference 15 December in Tampa, FL. Ultrasound can see patient's veins as well as a syringe entering an area, which helps ensure the needle is put in the right place. (U.S. Army photo by SSG Jeremy D. Crisp/ 3rd SFG (A)).



CPT William N. Vasios (left), physician assistant, 1st Bn, 3rd SFG (A), explains to an audience what is seen on the screen of a portable ultrasound machine while SFC Robert Lopez, Special Forces medic, 1st Bn., 3rd SFG, conducts a training exam using the machine during the SOMA's annual conference 15 December in Tampa, FL. Lopez used the machine exclusively during his latest deployment and he and Vasios have been big proponents of helping get the machines in the hands of more Special Forces medics. (U.S. Army photo by SSG Jeremy D. Crisp/ 3rd SFG(A)).



Clinicians attending the forum on portable ultrasound are given live views of the machine's capabilities during the SOMA annual conference 15 December in Tampa, FL. The all-day session involved practical training and lectures on the use of portable ultrasound. The forum included briefings from Soldiers with 3rd SDFG(A) about their effective use of portable ultrasound in a combat environment.

(U.S. Army photo by SSG Jeremy D. Crisp/ 3rd SFG (A)).

CME ARTICLES WANTED!

The JSOM needs you to submit continuing medical education (CME) articles!!!! CME consists of an educational article which serves to maintain, develop, or increase the knowledge, skills, and professional performance and relationships that a physician uses to provide services for patients, the public, or the profession. The content of CME is that body of knowledge and skills generally recognized and accepted by the profession as within the basic medical sciences, the discipline of clinical medicine, and the provision of healthcare to the public. A formally planned Category 1 educational activity is one that meets all accreditation standards, covers a specific subject area that is scientifically valid, and is appropriate in depth and scope for the intended physician audience. More specifically, the activity must:

- Be based on a perceived or demonstrated educational need which is documented
- Be intended to meet the continuing education needs of an individual physician or specific group of physicians
- Have stated educational objectives for the activity
- Have content which is appropriate for the specified objectives
- Use teaching/learning methodologies and techniques which are suitable for the objectives and format of the activity
- Use evaluation mechanisms defined to assess the quality of the activity and its relevance to the stated needs and objectives

To qualify for 1 CME, it must take 60 min to both read the article and take the accompanying test. To accomplish this, your articles need to be approximately 12 – 15 pages long with a 10 – 15 question test. The JSOM continues to survive because of the generous and time-consuming contributions sent in by physicians and SOF medics, both current and retired, as well as researchers. We need your help! Get published in a peer-review journal NOW! See General Rules of Submission in the back of this journal. We are always looking for SOF-related articles from current and/or former SOF medical veterans. We need you to submit articles that deal with trauma, orthopedic injuries, infectious disease processes, and/or environment and wilderness medicine. More than anything, we need you to write CME articles. Help keep each other current in your re-licensure requirements. Don't forget to send photos to accompany the articles or alone to be included in the photo gallery associated with medical guys and/or training. If you have contributions great or small... send them our way. Our e-mail is: JSOM@socom.mil.

Editorials

Maj Joshua M. Tobin, MD

I read with interest the article “Damage Control Resuscitation for the Special Forces Medic: Simplifying and Improving Prolonged Trauma Care” (JSOM 2009, Vol 9, Eds 3-4) by Dr. Risk and Mike Hetzler, 18D. I agree that resuscitation of the trauma patient is of paramount importance, and is an equal partner with the surgical procedure. Perfect surgery on a poorly resuscitated patient is just as fruitless as failed surgery on a well resuscitated patient.

I am excited to see this information being pushed out as far as possible. I am concerned, however, that this will put the SOF medic in a difficult position. I was a paramedic for many years before getting my medical degree and I understand the capabilities, and limitations, of medics. In my current assignment I work closely with the Pararescue community and, while deployed, have treated patients with NSW Corpsmen and SF 18Ds. I have great admiration for these dedicated medical Operators and am honored to serve with them.

However, we are not providing good leadership for these men by adding another extensive skill set to their already exhaustive credentials. Given the current deployment cycle and high ops tempo, it is a challenge for the PJ/SOCM/18D/NSW Corpsman to maintain currency in their operational skill sets (weapons, MFF, etc). It is not reasonable to expect a medic, no matter how capable and motivated, to maintain another “critical care” skill set.

The authors assert “The scope and duration of care provided by SF medics may equate to that of a physician at more than one conventional level.” If this is the case, then we need to provide field medical officer support for these operations. I propose that a tactical evacuation model with a medical officer and SOCM be designed to move casualties from the point of injury to a surgical facility, providing experienced critical care en route.

TACEVAC puts a medical officer/SOCM team on a QRF platform. This is not unlike the crew configurations in several foreign militaries (e.g., Australia, Israel) and some civilian helicopter EMS systems in the U.S. This is where damage control resuscitation can have the greatest impact. The more extensive skill set and seasoned experience of a critical care medical officer here can make all the difference down the chain of care.

Rangers have long sent their battalion surgeons to Ranger school. Special Forces is again sending some of their medical officers through the SFQC. The Air Force has developed and deployed Special Operations Critical Care Evacuation Teams (SOCCET) led by a critical care medical officer. We have in the Special Operations medical community, a group of rigorously selected, well trained, board certified physicians with extensive downrange combat experience. We must use them in innovative ways to address the evolving nature of medical care in this long war.

Maj (Dr.) Joshua M. Tobin is an Individual Mobilization Augmentee assigned to AFSOC at Pope AFB, NC. He is currently deployed on a Critical Care Air Transport Team and has deployed on the Special Operations Critical Care Evacuation Team (SOCCET). Major Tobin is board certified in both Critical Care Medicine and Anesthesiology. On the civilian side, he is the director of trauma anesthesiology at one of the busiest level I trauma centers in California.

EDITORIAL REBUTTAL

COL Greg Risk, MD

In response to Maj Tobin's editorial comments regarding damage control resuscitation and prolonged care, several issues require clarification. Several real world missions, which placed SOF medics in a situation with critical patients requiring prolonged care for periods in excess of those commonly encountered, drove the application of this approach. Several of these occurred outside of the Iraq and Afghanistan theaters of operation in nations that had well developed medical evacuation systems and robust levels of care to include access to surgical assets and blood component therapy, which the author may be using as his reference. On any given day, Special Operations forces (SOF) are active in 40 to 50 countries world wide, many in austere environments with little or no medical support except that organic to the deployed unit. The writer's comments are well intended, but fail to appreciate the perspective of the SOF medic. Some of these may have to do with the author's experiences doing evacuation work, and some may be service specific. This is not meant to denigrate the intent, as we each bring our service and individual background to looking at any given issue. Our project was undertaken with this in mind and a realization that with the maturation of both theaters and availability of medical assets, some of the traditional skills were eroding and in need of updates in keeping with advances in medical care.

First, the job description of paramedics, which the writer was, and that of forward deployed SOF medics are not comparable. The emergency medical technician – paramedics (EMT-Ps) work in prehospital systems within the Continental United States (CONUS). One of the challenges faced with continuing the National Registry of Emergency Medical Technicians – Paramedic (NREMT-P) program at the Joint Special Operations Medical Training Center (JSOMTC) has been finding the curriculum time for the pediatrics, geriatrics, and cardiac care required by paramedics. Our SOF medics are faced with managing severe trauma and critically injured patients with far more capabilities and for more prolonged periods of time than expected of paramedics.

Second, we are not "adding another extensive skill set" to SOF medic expectations. The ability to provide prolonged care has long been part of the doctrine, curriculum, and history of Special Operations medicine. We are updating this to include damage control resuscitation (DCR) for those casualties in more remote areas, or in a true unconventional warfare (UW) scenario for whom rapid transport and surgical intervention are not feasible in a timely fashion. Again, the writer's comments are based upon relatively recent ex-

periences in the current conflicts, and focused more on critical care transport. A more extensive review of UW medicine from the Spanish Civil War, the Philippine/U.S. guerrilla operations against the Japanese, as well as Office of Special Services (OSS), and partisan European operations in World War II, SOF missions in Vietnam, all the way up to early Iraqi and Afghanistan missions conducted by SOF, all reinforce a need for prolonged care. If we could transport all critically injured patients to the combat support hospital or operating table in one hour, then we would have little need for the concepts outlined in the article. The missions that initiated this project led us to believe that we cannot guarantee our patients that they will be evacuated in short order.

Third, the author also makes the statement that this is a competing skill set, one of many along with "weapons, military free fall, etc", which might be beyond our SOF medics. Let us be clear, our primary mission as SOF medics is medicine. Subordinating medical skills to other tasks negates our reason for selecting, training, and sustaining SOF medics. Rather than providing "not good leadership," we are confident that the SOF medics can maintain this skill set. As we have noted in other forums, translating the use of agents such as Factor VIIa, lyophilized plasma, and/or platelets as an "internal hemostatic" is a natural progression of the Tactical Combat Casualty Care (TCCC) concept promulgated by Butler, Hagmann, et al., originally. As we have previously noted, the only treatment for hemorrhagic shock is blood replacement; most other therapies are temporizing, and the unresuscitated shock patient faces a dismal outcome. The natural continuation of this is the ability to provide this therapy at the appropriate time, place, and manner.

The writer next contends that if SOF medics are going to be performing duties normally reserved for physicians in conventional units, then we need to "provide field medical officer support" and proposes a medical officer or Special Operations Combat Medic (SOCM) to move patients from point of injury to surgical care. While we are doing this to a limited extent in current conflicts, this misses the point on two counts. First, there are not enough medical officers available to provide this care, and only a few medical officers are qualified to operate with SOF far forward. Secondly, the author is again viewing this through his personal prism, but this is not an evacuation issue. The entire reason SOF medics are trained to perform advanced medical procedures and are so carefully selected and trained is to enable them to function at this much higher level, whether it is providing advanced

airway management, treatment normally reserved for the anesthesiologist/anesthetist, or use of surgical skills, laboratory training, and so forth. We have and will repeatedly be required to care for U.S., allied, coalition, and local forces as well as the indigenous population, some of which will face prolonged times to evacuate, or for whom evacuation is not possible. One of the authors spent considerable time caring for local forces in Central America 25 years ago for whom no evacuation was possible. The care provided determined our credibility with local national forces. The ability to develop and sustain these forces, and to operate “by, with, and through” may be the key to our success in the war on terrorism.

We truly appreciate the writer’s commentary, and it affords us the opportunity to clarify some of the misunderstanding associated with pushing what is a well-established concept at higher levels of care, down to the SOF medic level. As with the development of SOF medicine and introduction of TCCC, it will challenge some previous dogmas. Unlike the writer, and others of similar viewpoint, we will never be able to have sufficient physicians/medical officers to be in all places at all times. We believe updating what have been traditional SOF medicine roles for the 21st century with scientifically proven treatments and technology is more than justified when looked at with a more broad geographic, operational, and historical perspective.

COL Gregory Risk, emergency physician/flight surgeon, is currently assigned to USASOC. He completed FQC as 18D in 1982, and was assigned to 7th SFG. He graduated from Indiana University School of Medicine in 1993, and completed emergency medicine residency at Methodist Hospital in 1996. He was previously assigned as Asst Dean, Joint Special Operations Medical Training Center.

EDITORIAL

MSG Oscar L. Ware, BS, MSA, MPH, PhD Candidate

United States Army Special Forces Command Surgeons' Senior Enlisted Advisor USASFC(A)
Ft Bragg, NC

Medical sonography (ultrasonography) is an ultrasound-based diagnostic medical imaging technique used to visualize muscles, tendons, and many internal organs, to capture their size, structure, and any pathological lesions with real time tomographic images. There is no question as to whether or not ultrasound brings to bear an enhanced medical capability for the patient. Using portable ultrasound (US) to visualize the vein and to guide needle insertion is questionable; in my previous discussions of the US technique. I still contend it is very difficult (or nearly impossible) to visualize most accessible veins and borders on the realm of bad medicine if conducted by the 18D. I'm sure there is an anecdotal situation where someone could infer this procedure prudent; my stance is not against the isolated incidence or situation where this might be applicable.

At present there lacks a training module either in SOCM or SFMS/SOIDC where the 18D or 68WW1

is trained to a suitable standard that would warrant the broad dissemination of a piece of equipment that has an enormous price tag to field, not to mention maintain.

The role of the Special Forces medic encompasses many areas of medical knowledge. Adding an additional skill set (and recertification) into the rucksack of our medics' compounds a growing trend; let's get rid of this so we can accommodate that. I'm guessing the intent is to effect the MOS phase of the training to ensure interoperability and standards of training. In the last Special Operation Combat Medic Training Task Survey, medics indicated "training needs to start being emphasized in routine sick-call problems." This might be an area we focus on in developing the 18D and 68WW1 skill set. Okay, we acquiesce and purchase this item. Who maintains them and where on the MTOE do we put them ... ODA, ODB, or ODC? This will inevitably impact training, sustainment training, and training opportunities.

ABSTRACTS FROM CURRENT LITERATURE

Catecholamine Levels in Hypoxia-Induced Acute Mountain Sickness

Kamimori, Gary H.; Ryan, Edward J.; Otterstetter, Ronald; Barkley, Jacob E.; Glickman, Ellen L.; Davis, Harry Q.
Aviation, Space, and Environmental Medicine, Volume 80, Number 4, April 2009 , pp. 376-380(5)

ABSTRACT

Enhanced sympathoadrenal activity has been implicated in the pathogenesis of acute mountain sickness (AMS). This study was designed to examine the time course of circulating catecholamines in individuals with and without AMS. **Methods:** Subjects were low-altitude residents (ten men, eight women) who had not been exposed to altitude within the previous two mo. They breathed 12% O₂ (hypoxia equivalent to 4600 m altitude) for 8h while seated at rest. AMS was evaluated using Lake Louise scores (LLS) at zero, one, three, five, and seven hour of exposure using a threshold of three to define AMS. Blood samples were collected to measure arterial blood gases and oxygen saturation as well as arterial and venous epinephrine (A-EPI and V-EPI) and norepinephrine (A-NE and V-NE). **Results:** Eight subjects (44%) developed AMS at some time during the experiment. Blood gases showed no significant difference between subjects with or without symptoms (AMS+ and AMS-, respectively). However, AMS+ subjects showed significantly greater concentrations of A-EPI over the 8 h without any between-group difference in V-EPI. Levels of A-NE were significantly higher at baseline and during the first hour of hypoxia in subjects who later developed AMS. V-NE increased significantly over time among all participants with no difference between groups. **Conclusions:** These findings suggest a possible physiological marker for individuals who may be relatively susceptible to AMS and provide additional insight into the sympathoadrenal response to acute hypoxia.

Fatigue in Two-Pilot Operations: Implications for Flight and Duty Time Limitations

Powell, David; Spencer, Mick B.; Holland, David; Petrie, Keith J.

Aviation, Space, and Environmental Medicine, Volume 79, Number 11, November 2008 , pp. 1047-1050(4)

ABSTRACT

Objectives: Two-pilot operations make up the majority of commercial flights. Fatigue is an important consideration in these operations as there is little opportunity for in-flight rest. We investigated the role of duty length, time of day, and whether one or two sectors were flown on reported fatigue at the top of descent in two-pilot regional operations. **Methods:** Pilots flying two-pilot operations ranging from 3-12h completed Samn-Perelli fatigue ratings prior to descent at the end of each rostered duty over a 12wk period. We collected 3023 usable ratings (72% of rostered duties) comprising 26% single and 74% double sector duties. **Results:** We found that time of day has a marked effect on the pattern of fatigue at the start of the duty and on the rate at which fatigue levels increased, with the highest levels in the window of circadian low (0200-0600). Fatigue also increased with the length of duty and was 0.56 higher at the end of a two-sector compared with a single-sector duty. **Discussion:** The results imply authorities should consider increasing existing limits for daytime duties and reducing those for nighttime two-pilot operations.

Pediatric Fatalities Associated With Over the Counter (Nonprescription) Cough and Cold Medications

Richard C. Dart; Ian M. Paul; G. Randall Bond; David C. Winston; Anthony S. Manoguerra; Robert B. Palmer; Ralph E. Kauffman; William Banner; Jody L. Green; Barry H. Rumack
Annals of Emergency Medicine Volume 53, Issue 4, Pages 411-574

ABSTRACT

Study objective: The use of nonprescription cough and cold medicines is widespread, but their use has been sporadically associated with severe toxicity and death. We evaluate the role of these medications in pediatric fatalities and identified factors that contributed to the death. **Methods:** Fatalities that involved a child younger than 12 years and mentioned a cough and cold ingredient were obtained from five sources. An independent panel of eight experts (pediatrics, pediatric critical care, pediatric toxicology, clinical toxicology, forensic toxicology, forensic pathology) used explicit definitions to assess the causal relationship between medication ingestion and death. Contributing factors were identified. **Results:** Of 189 cases included, 118 were judged possibly, likely, or definitely related to a cough and cold ingredient. Of these 118 cases, 103 involved a nonprescription drug, whereas 15 cases involved a prescription medication alone. Of 103 cases associated with nonprescription drugs, the evidence indicated that 88 involved an overdose. A dosage could not be assessed in the remaining 15 cases. Several contributing factors were identified: age younger than two years, use of the medication for sedation, use in a daycare setting, use of two medicines with the same ingredient, failure to use a measuring device, product misidentification, and use of a nonprescription product intended for adult use. All cases that occurred in a daycare setting involved a child younger than two years. **Conclusion:** In our sample, pediatric fatalities caused by nonprescription cough and cold medications were uncommon, involved overdose, and primarily affected children younger than two years. The intent of caregivers appears to be therapeutic to relieve symptoms in some cases and nontherapeutic to induce sedation or to facilitate child maltreatment in other cases.

Evaluating Active Duty Risk-Taking - Military Home, Education, Activity, Drugs, Sex, Suicide, and Safety Method

Hutchinson, Jeffrey W.; Greene, Jeffery P.; Hansen, Shana L.
Military Medicine, Volume 173, Number 12, December 2008, pp. 1164-1167(4)

ABSTRACT

Psychosocial screening tools are routinely used by adolescent medicine providers to evaluate risk-taking behaviors and resiliency. A large number of U.S. military service members are adolescents, and many engage in behaviors that cause morbidity and death, such as tobacco use and binge drinking. Health care providers should consider the regular use of a psychosocial screening method to evaluate risk-taking behavior. The Home, Education, Activity, Drugs, Sex, Suicide, and Safety method is used to evaluate the home environment, educational, and employment situations, activities, drug use, sexual activity, suicide, and safety during health care visits. This technique, originally created for a civilian adolescent population, can be used with minimal adjustments to evaluate behaviors of military servicemembers.

Tourniquets Revisited

Swan, Kenneth G. Jr., MD; Wright, Deborah S., MS; Barbagiovanni, Stephanie S., DO; Swan, Betsy C., BS, RN; Swan, Kenneth G., MD
Journal of Trauma-Injury Infection & Critical Care. 66(3):672-675, March 2009.

ABSTRACT

Background: Controversy swirls about optimal control of life-threatening hemorrhage from an injured extremity whether in combat in the Middle East or in trauma care at home. Left unanswered are four critical questions: (1) What is the simplest tourniquet available? (2) Can it be used below the elbow and the knee? (3) Is pain a factor? (4) What data support so called "Pressure Points?" **Methods:** To address these questions, we measured the effects of three common tourniquets on arterial pulses (Doppler signals) at wrist and ankle of 10 healthy adult volunteers of either sex. We recorded ease of application (1-3, with 3 easiest) by the applicant and pain experienced by the subject (none, light, moderate, severe). Tourniquets were applied sequentially to arm, forearm, thigh, and leg. Tourni-

quet success was defined as sustained elimination of distal pulse. Pressure points were brachial artery in arm and cubital fossa, common femoral artery (groin), and popliteal artery (knee). The same criteria defined success. All numerical data were mean and standard error (SE) computed. Significance of apparent differences was assessed with Student's t test for paired observations. **Results:** Mean age was 36.5 +/- 6.0 years; blood pressure was 123 +/- 6/72 +/- 4mmHg. All three tourniquets (sphygmomanometer, 1/2 inch rubber tubing, cloth and windlass) were successful in all patients in all four locations with two exceptions. Thighs of two subjects were too large for the sphygmomanometer and one person experienced test terminating pain with the rubber tube on arm and thigh and with the cloth and windlass on the thigh. Manual (digital) occlusion of the brachial artery in the arm was possible in all but one subject; however, the Doppler signal at the wrist returned within 40.6 +/- 6.5 seconds in all but one of the other nine subjects. Pressure point control of the common femoral artery resulted in identical findings except that the pulse returned within 20.6 +/- 4.7 seconds despite sustained pressure. Attempts at control of the brachial artery at the elbow and the popliteal artery at the knee were less successful. **Conclusions:** Our data indicate that all tourniquets can be used successfully below the knee or elbow. The cloth and windlass is the easiest to apply. It is probably the most readily available or simplest to procure/improvise. Pain is irrelevant. "Pressure Point Control" of extremity arterial hemorrhage is a euphemistic misnomer.

Home Use of Automated External Defibrillators for Sudden Cardiac Arrest

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The New England Journal of Medicine Volume 358:1829-1836 April 24, 2008 Number 17

ABSTRACT

Background: The most common location of out-of-hospital sudden cardiac arrest is the home, a situation in which emergency medical services are challenged to provide timely care. Consequently, home use of an automated external defibrillator (AED) might offer an opportunity to improve survival for patients at risk. **Methods:** We randomly assigned 7001 patients with previous anterior-wall myocardial infarction who were not candidates for an implantable cardioverter-defibrillator to receive one of two responses to sudden cardiac arrest occurring at home: either the control response (calling emergency medical services and performing cardiopulmonary resuscitation [CPR]) or the use of an AED, followed by calling emergency medical services and performing CPR. The primary outcome was death from any cause. **Results:** The median age of the patients was 62 years; 17% were women. The median follow-up was 37.3 months. Overall, 450 patients died: 228 of 3506 patients (6.5%) in the control group and 222 of 3495 patients (6.4%) in the AED group (hazard ratio, 0.97; 95% confidence interval, 0.81 to 1.17; P=0.77). Mortality did not differ significantly in major prespecified subgroups. Only 160 deaths (35.6%) were considered to be from sudden cardiac arrest from tachyarrhythmia. Of these deaths, 117 occurred at home; 58 at-home events were witnessed. AEDs were used in 32 patients. Of these patients, 14 received an appropriate shock, and 4 survived to hospital discharge. There were no documented inappropriate shocks. **Conclusions:** For survivors of anterior-wall myocardial infarction who were not candidates for implantation of a cardioverter-defibrillator, access to a home AED did not significantly improve overall survival, as compared with reliance on conventional resuscitation methods.

Recovery of Multidrug-Resistant Bacteria From Combat Personnel Evacuated From Iraq and Afghanistan at a Single Military Treatment Facility

Murray, Clinton K.; Yun, Heather C.; Griffith, Matthew E.; Thompson, Bernadette; Crouch, Helen K.; Monson, Linda S.; Aldous, Wade K.; Mende, Katrin; Hospenthal, Duane R.

Military Medicine, Volume 174, Number 6, June 2009, pp. 598-604(7)

ABSTRACT

U.S. combat casualties from Iraq and Afghanistan continue to develop infections with multidrug-resistant (MDR) bacteria. This study assesses the infection control database and clinical microbiology antibiograms at a single site from 2005 to 2007, a period when all Operation Iraqi Freedom (OIF)/Operation Enduring Freedom (OEF) casual-

ties admitted to the facility underwent initial isolation and screening for MDR pathogens. During this three-year period, there were 2,242 OIF/OEF admissions: 560 in 2005, 724 in 2006, and 958 in 2007. The most commonly recovered pathogens from OIF/OEF admission screening cultures were methicillin-resistant *Staphylococcus aureus* (MRSA), *Klebsiella pneumoniae* and *Acinetobacter*. The yearly nosocomial infection rate of these three pathogens among OIF/OEF admissions ranged between two and four percent. There were remarkable changes in resistance profiles for *Acinetobacter*, *K. pneumoniae*, and *S. aureus* over time. Despite aggressive infection control procedures, there is continued nosocomial transmission within the facility and increasing antimicrobial resistance in some pathogens. Novel techniques are needed to control the impact of MDR bacteria in medical facilities

Circumcision — A Surgical Strategy for HIV Prevention in Africa

Ingrid T. Katz, MD, MHS and Alexi A. Wright, MD

The New England Journal of Medicine Volume 359:2412-2415 December 4, 2008 Number 23

ABSTRACT

In a radical departure from earlier strategies, public health officials are now arguing that circumcision of men should be a key weapon in the fight against infection with the human immunodeficiency virus (HIV) in Africa. Recent studies have shown that circumcision reduces infection rates by 50 to 60% among heterosexual African men. Experts estimate that more than three-million lives could be saved in sub-Saharan Africa alone if the procedure becomes widely used. But skeptics argue that efforts to “scale-up” circumcision programs on the continent that has the fewest physicians per capita may draw funds away from other necessary public . . .

Traumatic Bladder Rupture in a Paratrooper

Ford, David; Palma, James; Robinson, John

Military Medicine, Volume 174, Number 6, June 2009, pp. 662-665(4)

ABSTRACT

A paratrooper presents after a parachuting accident with the inability to urinate. Initial emergency bedside ultrasound, followed by confirmatory abdominal CT, is carried out and demonstrates an intraperitoneal bladder rupture. The patient is taken to the operating room and a three-layer closure with omental buttressing is carried out.

Long-Term Outcomes of Unilateral Transtibial Amputations

Ebrahimzadeh, Mohamad H.; Hariri, Sanaz

Military Medicine, Volume 174, Number 6, June 2009 , pp. 593-597(5)

ABSTRACT

Background: The long-term outcomes of wartime transtibial amputations have not been well documented. The purpose of this case series is to present the long-term functional, social, and psychological outcomes of modern-day military unilateral transtibial amputees. **Patients and Methods:** the Iranian Veterans Administration of the Khorasan province invited their Iranian military amputees from the Iran-Iraq War (1980-1988) to its medical center for evaluation. The patients filled out a detailed questionnaire and were interviewed and examined by each team member. **Results:** Two hundred (77%) of the 260 invited amputees were willing and able to come back for follow-up. Ninety-six of these patients (48%) were unilateral transtibial amputation. The average follow-up was 17.4 years (range 15-22 years). Land mines were the leading cause of war injury necessitating a transtibial amputation (68%). The most common symptoms about their amputated limbs were phantom sensations (54%), phantom pain (17%), and stump pain (42%). Lower back pain, contralateral (nonamputated limb) knee pain, and ipsilateral (amputated limb) knee pain were reported by 44%, 38%, and 13% of subjects, respectively. Sixty-five percent of patients were employed or had been employed for multiple years after their war injury. All patients were married, and 97% had children. Fifty-four percent of amputees reported psychological problems; 26% were currently utilizing psychological support services. **Conclusions:** At long-term follow-up, most military transtibial amputees experienced phantom sensation or some type of stump pain. More than half had persistent psychiatric problems, but only about half of these patients were receiving psychological treatment. Although this case series reports the status of these

amputees, the next step would be to prospectively follow modern wartime amputees using standardized, validated outcome measures. With the goal of optimizing long-term amputee outcomes, researchers should correlate outcomes with demographics, injury characteristics, and treatments to identify and modify factors affecting the amputees' prognosis.

Fever, Headache, and Myalgias after Deployment to the Philippines

Trayers, Frederick J.; Simon, John; Praske, Steven P.; Christopher, Kevi L.
Military Medicine, Volume 173, Number 12, December 2008 , pp. 1188-1193(6)

ABSTRACT

Classic dengue fever presents with a triad of fever, headache, and rash. A “saddleback” fever pattern, morbilliform rash with islets of sparing after apyrexia, and hematological/hepatic abnormalities are common findings. As the most common arbovirus infection, dengue is a significant health threat to deployed military forces worldwide. Preventive measures such as personal protective equipment and repellants should be employed by individuals and other preventive measures should be considered for units departing endemic areas. Due to the increased risk of severe or hemorrhagic syndromes in the case of reinfection, limiting redeployment of individuals who have been infected by dengue should be considered, and further research is needed in this area. Development of tetravalent or DNA-based vaccines should be a priority to improve health protection for deploying forces.

RESPECT-Mil - Feasibility of a Systems-Level Collaborative Care Approach to Depression and Post-Traumatic Stress Disorder in Military Primary Care

Engel, Charles C.; Oxman, Thomas; Yamamoto, Christopher; Gould, Darin; Barry, Sheila; Stewart, Patrice; Kroenke, Kurt; Williams, John W.; Dietrich, Allen J.
Military Medicine, Volume 173, Number 10, October 2008, pp. 935-940(6)

ABSTRACT

Background: U.S. military ground forces report high rates of war-related traumatic stressors, post-traumatic stress disorder (PTSD), and depression following deployment in support of recent armed conflicts in Iraq and Afghanistan. Affected servicemembers do not receive needed mental health services in most cases, and they frequently report stigma and significant structural barriers to mental health services. Improvements in primary care may help address these issues, and evidence supports the effectiveness of a systems-level collaborative care approach. **Objective:** To test the feasibility of systems-level collaborative care for PTSD and depression in military primary care. We named our collaborative care model “Re-Engineering Systems of Primary Care for PTSD and Depression in the Military” (RESPECT-Mil). **Methods:** Key elements of RESPECT-Mil care include universal primary care screening for PTSD and depression, brief standardized primary care diagnostic assessment for those who screen positive, and use of a nurse “care facilitator” to ensure continuity of care for those with unmet depression and PTSD treatment needs. The care facilitator assists primary care providers with follow-up, symptom monitoring, and treatment adjustment and enhances the primary care interface with specialty mental health services. We report assessments of feasibility of RESPECT-Mil implementation in a busy primary care clinic supporting Army units undergoing frequent Iraq, Afghanistan, and other deployments. **Results:** Thirty primary care providers (family physicians, physician assistants, and nurse practitioners) were trained in the model and in the care of depression and PTSD. The clinic screened 4,159 primary care active duty patient visits: 404 screens (9.7%) were positive for depression, PTSD, or both. Sixty-nine patients participated in collaborative care for six weeks or longer, and the majority of these patients experienced clinically important improvement in PTSD and depression. Even although RESPECT-Mil participation was voluntary for providers, only one refused participation. No serious adverse events were noted. **Conclusions:** Collaborative care is an evidence-based approach to improving the quality of primary care treatment of anxiety and depression. Our version of collaborative care for PTSD and depression, RESPECT-Mil, is feasible, safe, and acceptable to military primary care providers and patients, and participating patients frequently showed clinical improvements. Efforts to implement and evaluate collaborative care approaches for mental disorders in populations at high risk for psychiatric complications of military service are warranted.

Sleep at Simulated 2438m: Effects on Oxygenation, Sleep Quality, and Postsleep Performance

Muhm, J. Michael; Signal, T. Leigh; Rock, Paul B.; Jones, Stephen P.; O'Keeffe, Karyn M.; Weaver, Matthew R.; Zhu, Shuying; Gander, Philippa H.; Belenky, Greg
Aviation, Space, and Environmental Medicine, Volume 80, Number 8, August 2009, pp. 691-697(7)

ABSTRACT

Introduction: Crewmembers on ultra long-range commercial flights have the opportunity for rest and sleep in onboard areas in which the barometric pressure is 75.3kPa (565mmHg) or higher, equivalent to a terrestrial altitude of 2438m (8000ft) or lower. Sleep at higher altitudes is known to be disturbed, resulting in postsleep neurobehavioral performance decrements. We investigated the effects of sleep at 2438m on oxygen saturation, heart rate, sleep quantity, sleep quality, postsleep neurobehavioral performance, and mood. **Methods:** Twenty men, 30-56 yr of age, participated in a blinded cross-over investigation conducted in a hypobaric chamber to compare the effects of sleep at altitude (ALT, 2438m) and ground level (GND, 305m). **Results:** SpO₂ measured before sleep was significantly lower at ALT than at GND, $90.7 \pm 2.0\%$ (average \pm SD) and $96.2 \pm 2.0\%$, respectively. During sleep, SpO₂ decreased further to $86.1 \pm 2.0\%$ at ALT, and $92.3\% \pm 2.0\%$ at GND. The percent of time during which SpO₂ was below 90% was 44.4% (3.6-86.9%) at ALT and 0.1% (0.0-22.9%) at GND. Objective and subjective measurements of sleep quantity and quality did not differ significantly with altitude, nor did postsleep neurobehavioral performance or mood. **Discussion:** The absence of significant changes in sleep and postsleep neurobehavioral performance associated with pronounced oxygen desaturation during sleep was unexpected. Further study is needed to determine if the same effects occur in women and to characterize the changes in respiratory physiology that occur during sleep at 2438m in both sexes.

Cognitive function during acute cold exposure with or without sleep deprivation lasting 53 hours

Spitznagel MB, Updegraff J, Pierce K, Walter KH, Collinsworth T, Glickman E, Gunstad
J. Aviat Space Environ Med 2009; 80:703-8.

ABSTRACT

Introduction: Cold exposure and sleep deprivation are independently associated with transient cognitive impairment, including difficulty in attention, reaction time, and executive function. The possible interactive effects of cold exposure and sleep deprivation on cognition have not previously been examined. **Methods:** Six apparently healthy young adult men participated in a within-subjects design with two counterbalanced 53-h protocols: 2h cold exposure (10°C) blocks every 24h with normal sleep (Cold), and the same cold exposure in addition to 53h of complete sleep deprivation (Cold + Sdep). Computerized cognitive tasks of attention, reaction time, and executive function were completed every 4h during Cold + Sdep, and every 4 waking hours during Cold. **Results:** Cold was associated with a decline in attention over time ($b = -0.06$). Cold + Sdep was associated with greater attentional decline than Cold ($b = -0.13$), a significantly reduced speeded/reaction time performance ($b = 0.02$; $b = -0.13$), and a trend toward reduced cognitive inhibition over time ($b = -0.10$). **Discussion:** Findings suggest an additive effect of sleep deprivation to cold exposure in attention and reaction time, and a trend toward this pattern in aspects of executive functioning. These findings raise concern for errors when careful attention and speeded cognitive flexibility are necessary and optimal sleep and protection from the environment is not possible. Mechanisms are not entirely clear, but may be related to transient cerebrovascular or neurochemical changes, or direct physiological effects. Further work is needed to clarify mechanisms for the additive cognitive decline associated with cold exposure and sleep deprivation.

Medical Humanitarian Missions

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Many family physicians are engaged in medical humanitarian operations throughout the developing world, and many more have considered such participation.¹ The term “medical mission,” originally a subset of religious missionary work, is used here to mean any humanitarian medical endeavor.² Over the past two years, we have planned, organized, and led 10 humanitarian assistance operations in the Trans-Sahara region of Africa. These experiences have ranged in length from three days to three weeks, and have involved patient counts from 200 to well over 2,000.

All of our experience is courtesy of the U.S. Armed Forces, which simplifies the basics of finding a sponsoring agency and determining that agency’s ability to provide logistic support. Although the process of finding a sponsoring agency is somewhat more complicated for civilian physicians who would like to participate in a humanitarian mission, there are numerous organizations (faith-based and secular) that place physicians in medical missions around the world for periods of weeks to years (*Table 1*).

Table 1:
Organizations with Medical Mission Opportunities

American Academy of Family Physicians

(<http://www.aafp.org/online/en/home/clinical/disasterprep/humanitarian.html>)

American Academy of Pediatrics

(<http://www.aap.org/cgi-bin/overseas/aapartcl.cfm>)

Christian Medical and Dental Associations

(<http://www.cmda.org/cmm>)

International Medical Volunteers Association

(<http://www.imva.org>)

Samaritan’s Purse World Medical Mission

(<http://www.samaritanpurse.org/index.php/WMM/index/>)

The Evangelical Alliance Mission

(<http://www.teamworld.org>)

The International Center for Equal Healthcare Access

(<http://www.iceha.org>)

Although there are rare opportunities to participate in funded events, most organizations will not provide funding. At a minimum, you should plan to provide your own transportation and meals.³

This editorial is based on our limited experience in medical humanitarian missions, and the following recommendations come from lessons we learned the hard way.

HAVE A GOAL

Consider your motivation for participating in this endeavor. Do the goals of the organization you are supporting align with your own? Is this a single visit or an ongoing mission? For short-duration missions (i.e., up to one month), consider a mission that predominantly serves children who tend to have more acute illnesses with higher likelihoods of cure from a focused intervention. Children also stand to benefit most from simple treatments like vitamin A supplementation or deworming.^{4,5} (*Table 2*).

MAKE A PLAN

New missions should be coordinated with the U.S. Agency for International Development, which receives guidance from the Department of State. Request a meeting with the regional medical officer of the host nation, who can often provide data on things such as local disease prevalence, seasonality of diseases, and referral hospitals. The help of local officials is vital to conducting a smooth operation. Visit the regional hospital for your target area to learn how local physicians diagnose and treat regionally significant diseases. Before you begin, know where you will refer very ill patients. Determine credentialing requirements and medical liability for visiting physicians — often, neither is required.⁶

The formulary should be primarily based on the safety profile and effectiveness of each drug. The ability to affect a cure in a single dose reduces the possibility of harming patients from dosing misunderstandings. Do not attempt to force changes to any existing protocols, formularies, or infrastructure that will not be sustainable after you depart.

Table 2:
Medical Resources for Humanitarian Missions

WHO vitamin A distribution guide

(<http://www.who.int/vaccines-documents/DocsPDF/www9836.pdf>)

WHO deworming guide

(http://whqlibdoc.who.int/hq/2004/WHO_CDS_CPE_PVC_2004.11.pdf)

The American Society of Tropical Medicine and Hygiene

(<http://www.astmh.org>)

Tropical Medicine Central Resource from Uniformed Services

University of the Health Sciences

(<http://tmcr.usuhs.edu>)

The Queen's Medical Center Hawaii Medical Library

(<http://www.hml.org/WWW/tropical.php>)

Traveler's Health: Yellow Book

Arguin PM, Kozarsky PE, Reed CM, eds.

CDC Health Information for International Travel 2008.

Philadelphia, Pa.: Elsevier Mosby; 2007.

(<http://wwwn.cdc.gov/travel/contentYellowBook.aspx>)

WHO = World Health Organization.

BE FLEXIBLE

Working in any developing nation is challenging; things will change, and change again. Try to remember that no matter how substandard the facilities and resources of the location are, this is what the locals have and they are doing their best with what they have. Keep in mind that this is really not about you: they got by before you showed up, and they will continue to do so after you leave.

PREPARE YOUR TEAM

Make sure that team members have appropriate immunizations and malaria prophylaxis. Establish a medical evacuation plan in the event of significant illness or injury to a team member. Many organizations require commercial medical or evacuation insurance. If you do not speak the local language, find a good (vetted) interpreter. Learn local greetings and polite phrases, in addition to local manners.

ENFORCE SECURITY

Crowd control cannot be overemphasized. Even if you help many patients, leaving an angry mob at the end of the day will erase the good will of your efforts. Control of the patient line starts with planning: In initial meetings, underpromise (and subsequently over-deliver) on the number of patients you will be able to treat. When you ultimately see more patients than promised, satisfaction will be high. Enlist the local authority figures (e.g., mayor, chief, elders) to help control the crowd. Never do "giveaways" in a crowd — this can create instant and profound chaos — and do not allow team members to give away things such as water, food, candy, or empty water bottles. These items and surplus supplies can be given to a local official for distribution after you have gone.

TAKE A TEAM PHOTOGRAPH

Why consider taking the time to stop and get a good photograph of the mission team? Under the altruistic overtone of the mission is the reality that this is a chance to see a part of the world and to encounter disease processes that you may not have seen otherwise, and to gain insight into a way of life about which you may have never known. The clinical questions you will come across are likely to fuel your desire to study medicine with an enthusiasm you may not have had for some time. Volunteering in the developing world and seeing the day-to-day hardships that persons there struggle with may help you gain a lasting sense of perspective on your own challenges. Taking a photograph is a tangible way to capture some of the vigor and experiential lessons you and other team members may want to preserve from the mission.

We started our efforts in medical humanitarian missions with a sincere hope of improving the lives, however modestly, of the persons to whom we brought medical care. Although we have met with some level of success in this goal, the impression on ourselves, our world view, and our practice of medicine has been far greater.

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Author disclosure: Nothing to disclose.

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Pain Management In Current Combat Operations

Ian H. Black, MD, John McManus, MD, MCR

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ABSTRACT

Pain management in the U.S. military, particularly in combat, shares many of the same principles found in civilian healthcare organizations and institutions. Pain is one of the most common reasons for which Soldiers seek medical attention in the combat environment, which mirrors the civilian experience. However, the combat environment exacerbates the typical challenges found in treating acute pain and has the additional obstacles of a lack of supplies and equipment, delayed or prolonged evacuation times and distances, devastating injuries, provider inexperience, and dangerous tactical situations. These factors contribute to the difficulty in controlling a Soldier's pain in combat. Furthermore, civilian healthcare providers have also learned the importance of practicing pain management principles in austere and tactical environments because of recent natural and man-made domestic disasters. Pain management research, education, and treatment strategies have been created to try to achieve adequate battlefield analgesia, and these lessons learned may aid civilian healthcare providers if the circumstances arise. This article presents a brief history and current overview of pain management for combat casualties on today's battlefield. Recent natural disasters and increased threats for terrorist acts have proven the need for civilian healthcare providers to be properly trained in pain management principles in an austere or tactical environment.

INTRODUCTION

The U.S. military's response to battlefield pain control has been shaped by the nation's conflicts and the pain management technologies available. During the Revolutionary War, prior to the development of anesthesiology as a medical specialty, which was not to occur for almost a century, "anesthetic" medications for war surgery were limited to opium, wine, grog (rum), vinegar, or, more commonly, nothing at all. Pain relief depended on the speed and dexterity of the operating surgeon. One physician describing pain care of those injured on the battlefield in 1776 commented, "act in all respects as if you are entirely unaffected by their groans and complaints, but at the same time behave with such caution as not to proceed rashly or cruelly, and be particularly careful to avoid unnecessary pain."¹ The Civil War saw army physicians administering morphine for pain control and, occasionally, cannabis for tetanus and head injuries.² Beecher conducted landmark research in World War II, showing that 75% of casualties arriving at a field hospital did not want analgesic agents or had minimal pain after having received morphine at least five hours previously.³ During the Vietnam War, regional anesthesia (particularly neuraxial anesthesia) was used to increase operating room efficiency.⁴ In Somalia, neuraxial anesthesia was used to ensure that a patient could be immediately air-evacuated after debridement. During the present conflict, Operation Iraqi Freedom (OIF), the Tri-service Military Advanced Regional Anesthesia and Analgesia (MARAA) group has championed the use of accepted, cutting-edge analgesic technology and techniques.

While all of these examples demonstrate the Army's commitment to analgesia, the fundamental questions that Beecher's study raised remain unanswered: Is combat pain different from noncombat pain, when should pain first be treated in the battlefield, and how does acute pain control affect both immediate and long-term outcomes? Previous studies have shown that failure to recognize and appropriately treat acute pain may result in an increased incidence of

chronic pain⁵ and posttraumatic stress disorder (PTSD).^{1,6} The U.S. military understands the long-term consequences of failing to identify and treat acute pain and that, like our civilian counterparts, we most likely under treat acute pain.⁷ Because of this, there is renewed interest in the recognition of, treatment of, education in, and research in battlefield pain management.

OVERVIEW OF BATTLEFIELD HEALTH SERVICE SUPPORT

The U.S. Army's health service support in combat operations is organized into levels (or echelons) of care from I through IV, with level V care located outside the combat theater and consisting usually of a Department of Defense (DoD) hospital (triservice military hospitals) or Department of Veterans Affairs (VA) hospitals.⁸ These levels of care denote capabilities available at that particular level. Patient evacuation usually occurs through each level as necessary, with expansion of medical capability at each additional level. Level I healthcare is the first medical care a Soldier receives and is unit-level health care that includes treatment and evacuation from the point of injury or illness to the unit's aid station. This level of care includes immediate lifesaving measures, disease and nonbattle injury prevention, combat stress support, casualty collection, and evacuation to supporting medical treatment. The initial treatment may be provided at the point of wounding or injury by self-aid or buddy aid and followed by trained medical personnel, usually an Army combat medic ("68Whiskeys" [68Ws]). 68Ws are trained to give morphine intramuscularly and intravenously. Furthermore, they are trained on how to administer oral transmucosal fentanyl citrate (OTFC). However, advanced providers (Special Forces medics, physician assistants, etc.) are trained in advanced analgesic administration and techniques as discussed below. First aid is provided on scene, and then the casualty is usually conveyed or directed to the aid station. The aid station provides essential emergency

TABLE 1. Description of Combat Health Service Support and Modalities of Analgesia

Levels of Care	Capability/Examples*	Providers	Modalities of Analgesia
I	Immediate care at the scene	Combat lifesaver/medic/paramedic	Morphine IM/IV/IO PO meloxicam/acetaminophen Peripheral blocks Advanced splinting As above, plus PCA
IIa	Treatment facility (basic emergency treatment) Holding for a few hours only Increased ancillary staff, holding capability and equipment (i.e., x-ray) Basic emergency treatment with increased holding for 72 hours No surgical capability	Physician/physician assistants	As above
IIb	Specialized surgical teams Lifesaving "damage control" and resuscitative surgery (general, orthopedic, limited neurologic)	General surgery, orthopedic, anesthesia, and critical care nursing	As above, plus basic regional anesthesia
III	Highest level of care in combat zone (modular hospital, i.e., combat support hospital [CSH])	Fully staffed hospital with some pain specialist capabilities	As above, plus advanced regional anesthesia, acute and chronic pain services
IV	Definitive medical care outside the combat zone (usually a field or general hospital)	As above, plus advanced pain specialists with multidiscipline ability	As above, plus pain service consultation
V	Designated DoD and VA hospitals within the continental United States	As above, plus chronic pain management and rehabilitation specialist	As above

*Each branch of service (Army, Navy, Air Force, and Marines) has different units and capabilities at each level of care.

DoD = Department of Defense; IM = intramuscular; IO = intraosseous; IV = intravenous; PCA = patient-controlled analgesia; PO = oral; VA = Veterans Affairs.

care and prepares the casualty for evacuation to the rear. The aid station has assigned advanced providers to include physicians and physician assistants. Although an advanced provider such as a physician assistant or physician may treat sick and wounded at the level I and IIa capability in a combat zone, these "roles" are still considered "prehospital." Casualties are then evacuated through the higher levels of care as required, to include level IIa (forward surgical team), level III (combat support hospital), level IV (field or general hospital), and level V, as described above.

Varieties of analgesic modalities for battlefield pain are available at each level of care, building on the previous capability, and are summarized in Table 1.

PAIN MANAGEMENT AT LEVELS I AND IIa

In the forward area of combat healthcare (levels I and IIa), care rendered here is considered "prehospital." The U.S. military has recognized the need to identify and treat combat pain at the point of injury. In previous conflicts, the main treatment for acutely wounded Soldiers in the "prehospital" setting of the battlefield was morphine, usually delivered by the intramuscular route. However, on today's battlefield, intravenous morphine is emphasized for combat casualties requiring analgesia.⁸⁻¹⁰ Improved intravenous access training and newer intraosseous devices have improved the access and delivery of analgesia.^{11,12} Furthermore, many medics now carry promethazine to relieve nausea associated with pain and opioid administration. In addition to improved delivery and titration of opioids for combat pain, most Special Forces in the prehospital combat environment carry a "pill pack." This pack contains meloxicam, a cyclooxygenase (COX)-2-selective nonsteroidal anti-inflammatory drug (NSAID), and acetaminophen to be self-administered by the individual Soldier who sustains a painful injury. The reason a COX-2-selective NSAID instead of a nonspecific NSAID is used for the treatment of moderate pain on the battlefield is because

NSAIDs have the potential for platelet dysfunction.^{13,14} Meloxicam does not appear to have this effect.^{15,16} An earlier iteration of the pill pack contained the selective COX-2 inhibitor rofecoxib, which is being replaced with meloxicam after concerns arose regarding rofecoxib. These oral medications in combination are synergistic, provide multimodal analgesia, are opioid-sparing, and do not prevent the Soldier from carrying his weapon.

Finally, other newer agents and routes of delivery are currently being utilized on the battlefield to treat analgesia. OTFC has been found to relieve moderate to severe pain on the battlefield¹⁷ and is currently carried by many Special Forces medics. An initial dose of 400 μ g is used, which typically causes a peak plasma concentrations of no greater than 2ng/mL; this plasma concentration is associated with a marked increase in the risk of respiratory depression. OTFC has a black box warning, and its use is off label, for the treatment of acute pain in opioid-naïve patients.¹⁸ Because OTFC reaches maximum serum levels after approximately 30 minutes, redosing may start 15 minutes after the previous unit has been completed (30 minutes after the start of the previous unit). It is important to note that while the median time to peak plasma concentration (T_{peak}) for 400 μ g was 25 minutes, T_{peak} demonstrated a wide range (20–240 minutes).¹⁹

Ketamine has also been utilized successfully as a prehospital analgesic in the combat setting.²⁰ Ketamine in subanesthetic doses is an almost ideal analgesic because of its profound pain relief,^{21,22} its potentiation of opioids,²³ its role in preventing opioid hyperalgesia,²⁴ and its large margin of safety.

Education and training in and performance of peripheral nerve blocks are also now being utilized in the prehospital combat environment by Special Forces medics, especially for extremity injuries.^{20,25} More difficult techniques such as catheter insertions and advanced nerve blocks are not done in this setting because of limitations in equipment and training. However, local wound infiltration or basic nerve blocks such as fascia iliaca,²⁶ intercostal,²⁷ or supracapular²⁸ blocks performed before transport can provide profound analgesia. These blocks also afford a very low risk-benefit ratio. Use of regional anesthesia is an important technique for treating combat casualties. When performed in the prehospital setting on the battlefield, regional anesthesia does not cause changes in respiratory or mental status and

allows the Soldier to possibly perform some minimal duty while awaiting evacuation.

PAIN MANAGEMENT AT LEVELS IIB AND III

At levels IIB and III there are specialized providers with additional pain management skills. It is important to note that in combat casualties a wide range of pain pathologies and etiologies are also found that are unrelated to battle injuries. Pain diagnoses often reflect the more mundane causes found in the civilian population. Postsurgical pain, motor vehicle injuries, heavy lifting, falls, physical training, extended diving, and wearing heavy gear accounted for over 65% of the causes that led to evacuation out of theater.²⁹ A review of 162 patients who were medically evacuated from theater and referred to a tertiary pain center showed that only 17% were injured during battle.²⁹ This mimics previous conflicts, where nonbattle injuries and illness accounted for the major source of combatant attrition.

Combat hospitals contain a pharmacy similar to that found in smaller U.S. hospitals, with many now possessing portable patient-controlled analgesia (PCA) devices that are both air-worthy and battery-operated. These PCAs can move throughout the entire continuum of care with the patient. There is also the availability of fluoroscopy to assist in imaging more advanced nerve blocks. In addition to single-shot peripheral nerve blocks, both neuraxial and advanced regional pain techniques are routinely employed when necessary. When pain was addressed and treated in Iraq in 38 patients with these more advanced techniques such as epidural steroids, facet blocks, and directed pharmacotherapy by a pain physician, the return-to-duty rate was approximately 80%.³⁰ This is markedly different from the 2% return-to-duty rate that was seen when 162 pain patients were treated outside the combat theater.²⁹ This also mimics return-to-duty rates seen with other injuries, where approximately 50% of Soldiers will return to duty if treated in theater, whereas very few will return to duty if treated in a treatment facility in the United States.

There is no clear explanation for the different return-to-duty rates, but the quicker recognition and use of advanced analgesic techniques for the treatment of acute pain may have contributed to the high return-to-duty rate. It may have simply been due to the logistics of returning Soldiers to theater once evacuated. Unfortunately, there is no clear evidence, even in the civilian literature, of the best therapy for pain. This is especially true with the heterogeneity of acute, chronic, and acute-on-chronic pain, the wide range of causes, and the wide range of treatment seen in this population.

PAIN MANAGEMENT DURING EVACUATION AND CRITICAL CARE TRANSPORT

The most seriously injured casualties are evacuated by specially trained and equipped critical care teams. These patients are typically transported out of theater within 24 hours after injury, receiving continuous infusions of sedatives and opioids in flight. The military is looking at computer-assisted algorithms such as target-controlled infusions (TCIs) and closed-loop sedation and analgesia to improve efficacy, increase safety, and reduce provider workload. The majority of patients who are less seriously injured, the “walking

wounded,” are medically evacuated through the air evacuation command system. Because of the high patient-to-provider ratio on these flights, analgesia is limited to routes, drugs, and doses that minimize adverse events. Intermittent boluses of morphine, PCAs, and continuous nerve catheters are the primary modalities used on these flights.³¹ Devices such as the cutaneous fentanyl PCA, once approved by the Food and Drug Administration (FDA), are currently being considered and may offer chances not only to provide effective analgesia, but also to reduce the analgesic gaps that are amplified in an austere environment.^{32,33}

ADJUNCTS TO PAIN MANAGEMENT

Appropriate analgesic therapy for combat patients in pain is not limited to pharmacologic agents. Although adequate and liberal use of agents is important, many nonpharmacologic interventions recommended to improve pain management are also utilized on today’s battlefield.^{14,34,35} In the prehospital combat setting, physical strategies that utilize nonpharmacologic interventions have proven useful. They include heat and cold application, massage or touch, positioning, comfort splinting, and temperature regulation.^{20,35} Other adjuncts to pain management are added at higher levels of care.

While opioids remain a mainstay of pain management, many adjuncts are now being used to reduce the total amount of administered opioids. In addition to the well-known side-effects of opioids (respiratory depression, nausea, pruritus, etc.), there is a body of evidence of less-appreciated side-effects (immunosuppression, hyperalgesia, etc.). Furthermore, there is a growing recognition that multimodality pain relief provides distinct advantages over single-agent opioid therapy.³⁶

The currently used adjuncts act by a variety of mechanisms. Low-dose ketamine is being used as both a part of total intravenous anesthesia (TIVA) and an effective analgesic. NSAIDs and acetaminophen are being used similarly to trends seen in civilian practice. Clonidine is being used in hemodynamically stable patients as an anxiolytic and as an opioid-sparing medication. Lastly, there has been interest in administering gabapentin for acute pain. Whereas the Cochrane Review on gabapentin for acute and chronic pain stated there was no clear benefit, several studies point to gabapentin as being effective in this setting.^{33,37,38} The role of gabapentin in the treatment of chronic neuropathic pain is less controversial. Pregabalin may also be effective and yield more consistent results secondary to its more predictable bioavailability.

As important as these nonopioid adjuncts are in the management of acute pain, they may play an even greater role in preventing chronic pain. Prevention may not simply be a function of reducing the intensity and quantity of acute pain; rather, there may be mechanisms that are blocked (e.g., punctuate hyperalgesia) that are essential to the development of chronic pain. The idea of preemptive and preventive analgesia remains under intense investigation and controversy. Because of the enormous financial and emotional burden that chronic pain places on the military healthcare system, early delivery of these adjuncts for acute combat pain management should be emphasized. These adjuncts are relatively avail-

able, easy to administer, and useful in treating acute pain, and have a low side-effect profile.

FUTURE DIRECTIONS

The U.S. military currently has several areas of research involving the identification and relief of combat-related pain. One such project entering human trials, "Novel Pain Therapeutics," involves developing a medical therapeutic agent that completely alleviates pain without affecting cognition, consciousness, or respiratory drive. This monoclonal antibody for nerve growth factor (NGF) may act as prophylaxis against experiencing intense pain.³⁹ This is sometimes incorrectly referred to as the "pain vaccine." The Battlefield Pain Control Task Area is organized to evaluate the optimal treatment of pain, the interaction of analgesic therapy with resuscitation, and the epidemiology of pain throughout the battlefield and recovery.

Also, the U.S. Army is aggressively investigating less-invasive routes of delivery for proven analgesics. For example, the Army is helping fund clinical trials of intranasal ketamine. These trials have shown great promise to date.⁴⁰ The Army is also working with manufacturers to develop nasal formulations of opioids. Other areas of research previously mentioned in this article include TCI, closed-loop delivery, cutaneous fentanyl PCAs, and "pain vaccines." There is also interest in more distant products such as super-long-acting local anesthetics.

CONCLUSION

Ongoing improvements in battlefield pain management have included better education in, training in, research in, and availability of state-of-the-art medications and techniques. These have improved the ability of the military's healthcare providers to provide safe and effective analgesia in "austere" combat environments. Battlefield pain management remains a priority for the U.S. Military's Combat Casualty Care research program.

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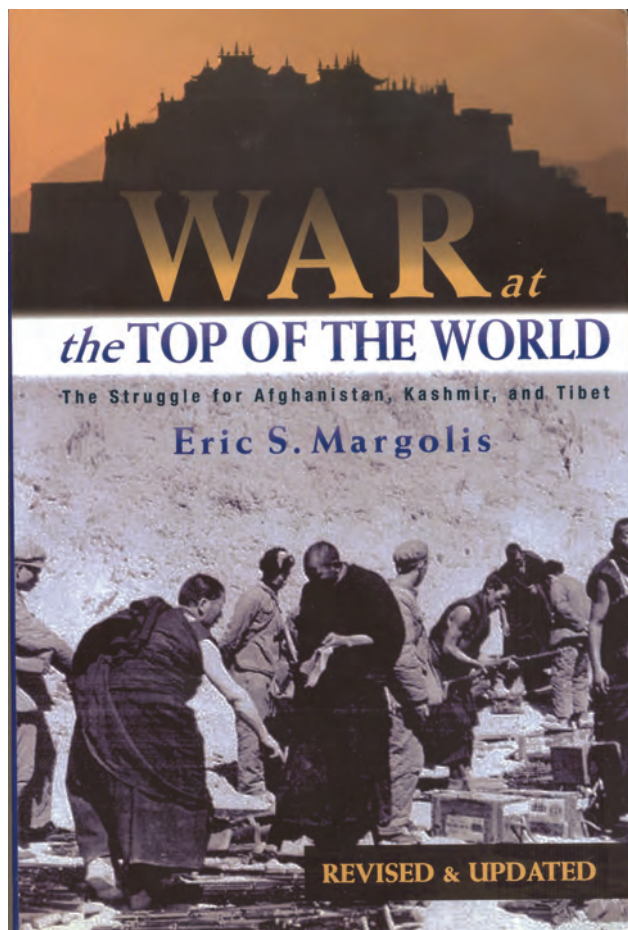


Book Reviews

War at the Top of the World: The Struggle for Afghanistan, Kashmir, and Tibet

By Eric S. Margolis. New York: Routledge. 2002. ISBN: 0-415-93468-0.

Review by LTC Craig A. Myatt



Across a geographically diverse continent with austere and plush landscapes, Asia contains terrain that rises to the highest elevations in the world. It is also fertile ground for war. It has been for millennia, although the mechanisms fueling war today differ from those in the past. Eric Margolis, author of *War at the Top of the World: The Struggle for Afghanistan, Kashmir, and Tibet* demonstrates that in the 21st century war at the top of the world incites a new era, the “Age of Geopolitical Dissolution.” The premise for war throughout much of Asia is

constant and has been throughout the ages. The solutions for peace are ever-increasingly unfolding. They require diligent and sophisticated approaches not unfamiliar to those trained in Special Operations. For that reason the Margolis text offers relevant insights, but the delivery of its resourcefulness is at times sluggishly tedious.

Margolis painstakingly reviews the benefits of understanding the causes and implications of committing military forces to any part of Asia. He ingeniously reveals how through most parts of Asia, especially in its hinterlands, military forces, and the governing powers deploying them, should capitalize on expanding cultural and social perspectives required to achieve relatively rapid success over the multiplicity of divisive forces. He demonstrates how al-Qaeda and Taliban forces initially did that for relatively rapid success in Afghanistan and Pakistan.

Al-Qaeda and Taliban forces used exploitation in their cause according to Margolis. Beyond exploitation, it became increasingly difficult for those forces to expand their influence over the multiplicity of divisive forces in Asia. Nonetheless, al-Qaeda and the Taliban ignited an era described by Margolis as the Age of Geopolitical Dissolution.

In the Age of Geopolitical Dissolution described by Margolis, Osama bin Laden emerged as the focal leader for the cause of modern Islamic absolutism. Margolis describes in a chapter entitled “Brother Osama” how bin Laden became a product of his times. As a human instrument, bin Laden helped redefine the times at the close of the last century. He became a marketable force, an agent of war.

Margolis provides a detailed description about bin Laden. The description covers historical and family information on bin Laden that one would typically find in a well developed psychobiography. With the emergence of bin Laden as a leader and hero of modern Islamic absolutism (targeted mainly against the United States), and the engagement of U.S. military forces in southwest Asia following the September 2001 attacks in the United States, the United States emerged again as a key player in Asian warfare.

Margolis demonstrates how the mechanisms fueling 21st century war in Asia differ from previous wars.

Though many of the warring tensions from centuries past in Asia remain relatively constant, the mechanisms driving those tensions differ. The mechanisms differ by virtue of the potential threat of nuclear war between Pakistan and India, controlling interests over natural resources by Russia with its own extensive nuclear arsenal, emerging competition across the continent between India and China, and a growing potential for geopolitical dissolution as leaders such as bin Laden and the Dalai Lama challenge powerful nation states with cultural and religious ideology.

One can conclude from Margolis' text that relatively rapid success achieved today over the multiplicity of divisive forces in Asia may yield only transient stability. The myriad of diverse ethnicities, religions, and warring factions from millennia ago, sustained later by the changing global governance of the 19th and 20th centuries, laid the seeds for early 21st century unconventional and irregular warfare in Asia. Margolis exploits

his writing prowess and appreciation of cultural history to paint a picture of only transient stability in Asia's future.

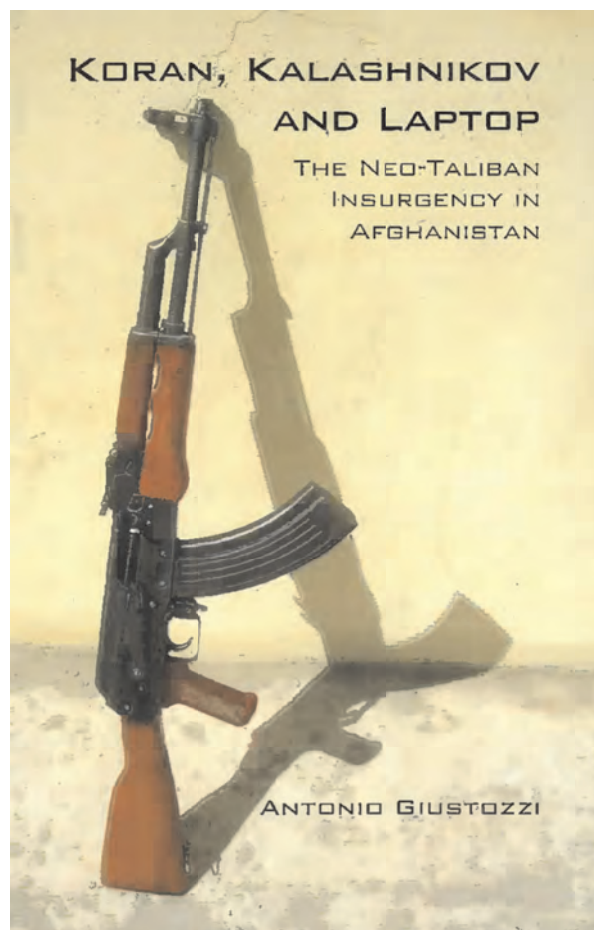
Had Margolis articulated a vision of Asian affairs following China's new emergence as a dominant world power, then perhaps he would have in conclusion unveiled for the reader more than transient stability in Asia's early 21st century experience. Margolis' vision for prescribed long-lasting peace and stability in Asia is clouded in the heights of Asia's geographic expanse by the simmering tensions he sees between China and India. His text does not extrapolate beyond those tensions. Neither does it reflect Russia's stance with China as a dominant world power. Nonetheless, Margolis understands the psychology of the Asian people, the diverse terrain that strengthens their character, and their noble tolerance of influences from non-Asian cultures. For any reader interested in learning more about Asia's warring tensions, and the prospects of peace and stability achieved by the U.S. military and other tenets of power in the U.S. Government, *War at the Top of the World: The Struggle for Afghanistan, Kashmir, and Tibet* is a book worth reading.

Koran, Kalashnikov, and Laptop: The Neo-Taliban Insurgency in Afghanistan

Antonio Giustozzi

Columbia University Press: New York, New York. 1st edition. August 1, 2009. Paperback: 224 pages. ISBN-10: 0231700105. ISBN-13: 978-0231700108.

Review by COL Warner "Rocky" Farr



The best book on the Taliban guerrillas as they were on 9/11/2001 is still Ahmed Rashid's *"Taliban."* Until now, there was no equally well-researched and well-written account of the Taliban's defeat, reforming, and the growth of the re-insurgency. This new book is not only well researched but also very insightful on many levels, though not as well written as Rashid's work. The author strictly confines himself to developments occurring between 2002 and 2007. It is not Rashid's book updated, but it is the best there is currently available right now on an important subject — Taliban reemergence and how they have changed in the process, as in: *"It's not your father's Taliban!"*

The book is a detailed study, chronicling the rise of what the author labels "the neo-Taliban." It contains separate chapters on sources of the Taliban insurgency, how and why the neo-Taliban were recruited, its organization, strategy, military tactics, and the counter-insurgency effort. It is well documented and cross-referenced. There are also several comparisons with insurgencies elsewhere in the world. The author discusses the continuing involvement of Pakistan, the neo-Taliban relationship with Al Qaeda, and the rural-versus-urban dimension of this struggle, and the drug trade.

Special Forces is also mentioned repeatedly in the book. A good example occurs in the section on the transition from SOF to conventional forces in 2002:

"Rather than operating in small units and spending weeks in the same location trying to forge links with the local population, the new arrivals carried out large sweeps covering many districts with large concentrations of force."

The author concludes that reining in the neo-Taliban by either armed force or diplomacy will be much more difficult than reining in the original Taliban eight years ago. He sees the group's strategy as having shifted in its new form, from national resistance to global jihad.

However, the book does suffer from poor "readability." It jumps around quite a bit, but does still contain the facts. It is an important book showing the evolution of a movement [the Taliban] into a more lethal entity, and enemy [the neo-Taliban]. This book should be mandatory reading for policymakers, diplomats, and military leaders. It is a must-read for all of us involved in this war because it is very relevant and thought provoking. Although it is not the definitive volume on the resurgent Taliban/neo-Taliban movement, it does fill the gap in the current scholarship on the current movement.

A prophetic statement appears in the conclusion, written in 2007:

"In this author's opinion, better results might have come from developing new and more institutionalized ways of managing sub-national administrations in Afghanistan, more inclusive of local communities' strongmen, and interest groups, ensuring at the same time that check and balances were established to prevent 'bad' authorities from tyrannizing larger sections of the population."

From the Command Surgeon



Virgil "Tom" Deal, MD
COL, USA
Command Surgeon
HQ USSOCOM



To all those smiling faces present at SOMA, please accept my thanks for taking the time to travel to Tampa, meet and share lessons learned, lessons not-so-well-learned, TTPs, and a lot of camaraderie. Just from listening to the banter, all of the Marriott's staff should now be much better versed in all aspects of SOF Medicine.

Admiral Olson took time out of a closely packed schedule to kick off the conference with his remarks and give some kudos to several of you Heroes. I'm told that we may well have had a record attendance, which speaks well of our acknowledging our individual and collective needs to continue to learn, teach, and share information.

With the excellent articles on damage control resuscitation and the news that Army has now stopped the teaching of IV fluid administration as a routine for trauma, I have to reflect that SOF has remained in the forefront on this shift in treatment philosophy. Shortly after the 1994 articles that questioned the value of IV crystalloid prior to surgical control of bleeding, CAPT Frank Butler kicked

off the beginnings of the care of the wounded - we now call it TCCC - that have become enshrined with SOF, and have now been adopted in other quarters. With new tools coming out every year, from Factor rVIIa to freeze-dried plasma, our ability to buy the severely wounded more time from injury to first surgical interventions can only improve. We'll be attending a conference on pre-hospital fluids later this week in Dallas, where I'm sure there will be more than a few references to the superb work you guys continue to do downrange.

COL Pete Benson will be representing us at a conference on MEDEVAC / CASEVAC issues where we've been invited to present the SOF perspective on problems or shortfalls in equipment, training, personnel, and airframes in air evacuation of our wounded. Please don't be bashful in sharing your thoughts or recent experiences along those lines with either of us to better arm us when we do get a seat at the policy-and-decision-making tables.



Peter J. Benson, MD
COL, USA
Command Surgeon

USASOC



Having recently returned from the Special Operations Medicine Association (SOMA) Conference in Tampa, it was great to see so many U.S. Army Special Operations Command (USASOC) units represented. Despite ongoing operations and busy schedules, I appreciate all who took the time and effort to make the conference worthwhile. The conference was a great success overall and I am always encouraged by the level of lively discussion and debate that takes place. Especially useful were the Army Special Operations Forces (ARSOF) Medic Conference presentations and hands-on practicum sessions sponsored by SFC Davila from the Deputy Chief of Staff (DCS), Surgeon's Office. I hope that this event continues to grow so that Special Operations Combat Medics (SOCMs) and Special Forces Medical Sergeants (SFMSs)(18Ds), as well as credentialed providers can benefit from such expert lessons and mentored hands-on training. I invite all participants to provide feedback on the sessions to SFC Davila or MSG Ware of this office in order to refine and improve the workshop sessions.

The USASOC Surgeon's Conference which preceded the SOMA Conference was a great benefit for me and the DCS, Surgeon's Office staff. The format was shortened to an evening prior to the senior leaders' meeting, followed by a one-day general session. This was my decision based on too many years of "This is what I did on my summer vacation" talks by the subordinate units. My vision of the USASOC Surgeon's Conference is that

it provides an opportunity for the Surgeon and senior medical leaders of the subordinate commands to discuss substantive issues in a common forum. Seldom during the year is it possible to gather all the units' medical leaders in one place.

For this office, this was a tremendous opportunity to exchange information and receive direct feedback from the units on such issues as: garrison health support, Medical Command (MEDCOM) borrowed military manpower and USASOC provider patient empanelment, utility of an internal USASOC forward resuscitative surgical element, advanced medical training for the SFMS, ASI W1 assignment management, utility of a non-18-series Soldier selection course, Civil Affairs Medical Sergeant training and management, the Tactical Human Optimization Rapid Rehabilitation and Reconditioning (THOR³) Program implantation, and more. I propose to continue this format and will try to repeat a senior medical leaders meeting on a more frequent basis.

As the U.S. strategy brings the surge of forces into Afghanistan, I want to stress to all our ARSOF medical providers how much the Force counts on your skills and abilities. USASOC has the best trained, mentally-adaptive, and operationally-flexible medical providers of any force in the world. You take care of the world's best Soldiers; please also take care of yourselves, your families, your comrades, and your leaders.

Sine Pari

COMPONENT SURGEON



Bart Iddins, MD
Brig Gen, USAF
Command Surgeon

To continue the discussion of Air Force Special Operations Command (AFSOC) Surgeon's priorities, this article focuses on **Priority 6:** Review AFSOC's medical organizational structure. Please see JSOM Winter 2009 edition for the complete priority list. For detailed reviews of Priorities 1 through 3, refer to JSOM's Spring 2009 edition; the Summer 2009 edition for Priority 4, and the Fall 2009 edition for Priority 5.

Regarding organizational structure, the pendulum generally swings between two extremes – on one end is *status quo*; on the other end is complete reorganization. These two diametrically opposed actions are powerful tools, but must be used for the right reasons at the right time. All too often, small organizational problems drive massive restructuring of the entire organization. Such occurrences appear to be especially common after a change in an organization's leadership.

This phenomenon is not new – Petronius Arbiter (27-66 AD) allegedly said, “We trained hard, but it seemed that every time we were beginning to form up into teams, we would be reorganized. I was to learn later in life that we tend to meet any new situation by reorganization; and what a wonderful method it can be for creating the illusion of progress while producing confusion, inefficiency, and demoralization.” On the other hand, as damaging as a reorganization can be when driven by the wrong reasons at the wrong time, maintaining the status quo can be equally damaging when changes in conditions, circumstances, and/or requirements should drive change in organizational structure. This is why Jack Welch, former CEO of General Electric, said, “Willingness to change is a strength, even if it means plunging part of the company into total confusion for a while.” AFSOC's medical organization has certainly not been immune to either phenomenon.

AFSOC



During its early period, AFSOC's medical organization consisted of squadron medical elements (SME) assigned directly to AFSOC operational flying units. Each SME was composed of one flight surgeon and two enlisted medics. A command surgeon and a small headquarters medical staff were responsible for professional oversight as well as the organize, train, and equip (OT&E) functions. Direct command and control (C2) was executed via the operational flying units. While in-garrison, AFSOC SMEs delivered comprehensive healthcare to aircrew and aircrew family members; but when deployed, AFSOC SMEs provided full-spectrum medical care, combat health service support, and Special Operations Forces (SOF) casualty evacuation (CASEVAC) for deployed SOF regardless of aircrew status. In other words, AFSOC medical personnel executed both a robust in-garrison healthcare delivery mission, as well as the deployed SOF combat support mission. Each of AFSOC's Special Operations Groups (SOGs) maintained medical unity of effort through a SOG medical resource manager. This organizational structure, which consisted of a small number of operational medical personnel and an infinitesimally small medical bureaucracy, was remarkably efficient and, more importantly, was also extraordinarily effective.

Nevertheless, in order to address a perceived problem with unity of effort and a perceived lack of centralized control, AFSOC's medical assets underwent a major reorganization in the mid-1990s. This reorganization forced the transfer of Special Operations Forces Medical Elements [(SOFME), formerly known as SMEs] authorizations from AFSOC's operational flying squadrons to each SOG's Operations Support Squadron (OSS). This extensive reorganization of SOFME C2 and squadron alignment brought about some definite bene-

fits, such as leveraging economies of scale and creating a leadership career path for SOFME officers and noncommissioned officers (NCOs), (e.g., it created Operations Support Medical (OSM) flights and established OSM flight commander/noncommissioned officer-in-charge (NCOIC) positions. Moreover, the reorganization added Medical Service Corps (MSC) planner and logistician positions to each OSS/OSM. This reorganization, nonetheless, resulted in a number of unintended consequences, (e.g., increased administrative overhead, and more notably, it disconnected the relationship between the SOFMEs and the flying squadrons/aircrew members against which the SOFMEs were (and are) resourced.)

As previously stated, before the reorganization, AFSOC's SMEs/SOFMEs were heavily engaged in both the in-garrison healthcare mission, as well as the deployed SOF combat support mission. However, after the reorganization, SOFME in-garrison focus shifted away from their aircrew healthcare/aerospace medicine mission. This shift left aircrew members *and* their family members underserved. The in-garrison shift in SOFME priorities resulted in a dramatic decrease in SOFME participation in all phases of healthcare delivery activities and the aerospace medicine program. Additionally, as a direct result, SOFME medical skills currency/proficiency suffered and declined. A similar phenomenon regarding medical skills currency/proficiency has occurred with AFSOC's Special Operations Surgical Teams (SOST) and Special Operations Critical Care Evacuation Teams (SOCCET).

The aforementioned unintended consequences drove AFSOC/SG staff to perform a comprehensive review of AFSOC's medical organization structure, to include C2 relationships, alignment of medical authorizations and mix of medical disciplines/specialties.

Initial analysis appeared to indicate the need for a comprehensive reorganization of AFSOC's operational medical assets. A preliminary course of action (COA) called for the transfer of SOFME authorizations back to the operational flying squadrons and the transfer of SOST/SOCCET authorizations to the 1st Special Operations Medical Group and the 27th Special Operations Medical Group (AFSOC military treatment facilities). In order to maintain unity of effort, this COA established a medical operations/medical resource management node (senior medical officer, MSC planner, senior noncommissioned officer and logistician) as part of each SOG's OSS. However, in an effort to avoid creating additional unintended consequences and the scenario described by Petronius Arbitrator, this medical reorganization COA was placed on the shelf. Rather than reorganize AFSOC's current medical organizational structure, the adopted COA establishes clear, objective, and measurable standards that reprioritize and balance in-garrison healthcare activities and in-garrison support to flying squadrons against other in-garrison requirements. Nevertheless, if this COA (which emphasizes a change in in-garrison priorities as opposed to reorganization) is unsuccessful, a comprehensive reorganization of AFSOC's operational medical assets will likely be required.

In short, while conducting an objective review of AFSOC's medical organizational structure, the reviewers deliberately and consistently avoided both extremes of the pendulum swing, (i.e., merely maintaining status quo) and the almost overpowering temptation, to immediately reorganize. Furthermore, regarding organizational structure, the reviewers heeded Laura Ingalls Wilder's observation, "The trouble with organizing a thing is that pretty soon folks get to paying more attention to the organization than to what they are organized for."

COMPONENT SURGEON



Gary Gluck, MD
CAPT, USN
Command Surgeon

Several significant events come to mind when reflecting on the last three months in Naval Special Warfare (NSW) medicine. The most significant was the annual Special Operations Medical Association (SOMA) conference in Tampa, Florida, from December 12-15, 2009. This is an exceptional event where all of SOCOM's components come together, along with a healthy mix of military, civilian, and international experts, to share lessons learned and discuss the latest developments in Special Operations medical care. Of particular note were Admiral Olson's opening remarks that specifically mentioned the many accomplishments of Special Operations medicine and the importance of such headline programs as Tactical Combat Casualty Care, Human Performance, and Family Support as he highlighted the medical advances in support of the world's most powerful human weapons system, the U.S. Special Operator.

Activities kicked off the day before SOMA with a NSW Component Surgeon's Conference. Normally a two-day affair, we crammed a broad range of headline topics into a one-day event. Topics included the Force Medical Office mission, vision, and goals for 2010, readiness, biomedical research programs, Family Support, and Resilience Programs, and updates from our NSW Groups and the NSW Center (BUD/S). CAPT Scott Jonson, Deputy Force Medical Officer, led the NSW Tactical Athlete Program break out session to open discussions on a Force-wide database and program growth initiatives.

NAVSPECWARCOM



The NSW Combat Medic of the Year award, presented at SOMA's "Mess Night" went to SO1 John A. Pepas. SO1 Pepas was recognized as the standout amongst his peers during deployment to Operation Iraqi Freedom from September 2008 to April 2009. In addition to skillfully managing a broad range of challenging medical conditions and combat casualties, SO1 Pepas was instrumental in setting up a fully capable medical clinic, providing trauma training for eighty Iraqi military personnel, and coordinating numerous joint Iraqi and SEAL missions. Likewise, as Leading Petty Officer for his Platoon, he developed plans that kept his team prepared for various combat contingencies.

The competition was tough for NSW Combat Medic of the year, with special mention going to SO1 Kiel Khan. While deployed to Operation Enduring Freedom, he provided immediate life-saving care to two team mates critically wounded while engaged with enemy forces. He provided suppressive fire while continuing treatment and successfully evacuating his wounded colleagues. In a separate action, SO1 Khan provided life-saving care to Afghanistan National Army and Coalition troops with combat injuries, all with successful outcomes.

We are honored to support these Operators who are leading the fight. It is my steadfast goal as Force Medical Officer to support our combat medics by all means within my capacity.

Another development was NSW's coordination of a memorandum of understanding with Tampa General Hospital to provide a unique and high-intensity trauma training

experience for our combat medics. Dr. Jeffrey Wilson (LCDR, USNR), a trauma surgeon and program faculty at Tampa General Hospital, will direct this exceptional training through an intensive didactic and hands on experience. With his dedication and hard work, we have formalized this Force wide training opportunity that will keep our combat medic's trauma skills finely tuned between deployments. Thanks to Tampa General Hospital leadership and Dr. Wilson!

Lastly, I want to recognize and congratulate my predecessor, CAPT Jay Sourbeer, on his selection as Executive Officer at Naval Hospital Oak Harbor, Washington State. Jay is a natural leader and I extend my best wishes to him and his family as they move to Whidbey Island.

Good luck and good hunting in the New Year!



COMPONENT SURGEON



Anthony M. Griffay, MD
CAPT, USN
Command Surgeon

MARSOC



MARSOC is on the move ... both literally and figuratively. This last quarter we really did move, about fifteen miles as the crow flies, across Camp Lejeune to our new headquarters building; but we also moved forward within the Special Operations Forces (SOF) commitment to the Global War on Terror by deploying our First Battalion Headquarters to Afghanistan. However, most importantly in my mind is that we have now moved past all the major changes I wrote about six months ago. Not only are we now in our new (very impressive, I might add) building, but we have a new Commanding General, a new organizational structure, and for the most part, the new medical leadership has settled in place. This was not done without some sense of loss as Master Chief Bill Cherry needed to make an unexpected move; by the time this is printed he will be assuming his new role with the U.S. Navy 3rd Fleet in San Diego. Master Chief Cherry was the original plank owner for the senior enlisted position at MARSOC and built that into not only the enlisted, but also the sole Navy representative on the MARSOC command deck where a Command Master Chief is rightly supposed to be. Bravo Zulu, Master Chief, for a job well done and it was an honor to work with you. In his place, Master Chief Tavita Saelua will be assuming the leadership role. Fresh off of an operational team, HMCM Saelua will, I have no doubt, keep MARSOC moving forward.

So where exactly is "forward" going to take us, you might be asking ... I know I am. For the most part,

forward will continue to be in the general direction we have already charted, but without all the sudden week-to-week changes in organization plans, deployment plans, and training plans. MARSOC will continue to focus on manning, training, and equipping operational teams and the Special Operations Task Forces (SOTFs) to control them. For Medical, that means we are projected to remain with the single purpose of supporting the operational teams. However, as I hope most of you saw in December at the Special Operations Medical Association (SOMA) conference, Medical can, and does, play a much more multidimensional role in the current SOF environment. Throughout SOMA topics like Humanitarian Assistance Teams, Surgical Support or Resuscitation Teams, Mobile Training Teams were presented and validated. However, as with anything in the military, capabilities follow needs and an unofficial medical conference is not viewed as a need. What is viewed is what is happening at the operational level.

So while MARSOC starts to move and continues using Medical in a one dimensional role, I need all of you to continue to push and improve your skills, increase your operational value, and make sure it is seen. If you use the after action reports (AARs) and the lessons learned formats so that a clear need is demonstrated at the operational level, I will continue to leverage that to justify and develop the needed capabilities. In other words, I cannot get a resuscitation team if no operational team has ever asked for that type of support. An AAR or lessons learned

saying how a mission would have been enhanced by an additional surgical capability or how a post-raid target could have been better exploited by a civil affairs team are examples of what I can leverage to lobby for additional capabilities to be built in MARSOC.

MARSOC is on the move, but the rough water should be behind us and our initial course is set ... Where Medical goes is now up to us.





SOC PAC



Frank J. Newton, MD
COL USA
Command Surgeon



In this issue of the JSOM, I submitted an article that reviews other force health protection (FHP) countermeasures to reduce the threat of disease to our Force. This short article is a practical guide that covers the rapid first aid and treat-

ment required for monkey bites. Their bites remain a dangerous health threat to our deployed SOF. Exposure to monkey (bites and scratches) puts one at risk not only for rabies, but for herpes B virus, which also can be a fatal infection.

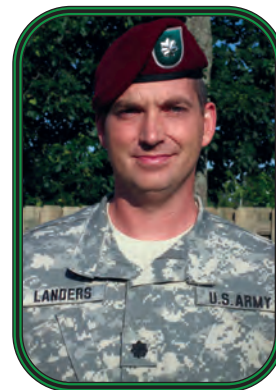
Special Forces Surgeon



LTC Andrew Landers, MD
COL, USA
Command Surgeon



USASFC



Greetings from Ft Bragg. I would like to thank everyone who attended SOMA and the Army Special Operations Forces (ARSOF) Medic Conference. This was the first year for the ARSOF Medic Conference and it seemed to be a worthwhile venture. We appreciate the feedback we received and encourage those that have not provided feedback to do so. You can use the 18D homepage (<https://www.us.army.mil/suite/page/594041>) to express your ideas and suggestions for next year's format and topics. The plan is to have more hands-on training, lectures, and workshops.

Training and readiness need to be at the forefront of your daily routine. We must emphasize the importance of medical readiness at all levels. This includes the transition to the Periodic Health Assessment (PHA) in place of the five-year physical. Each Group should implement a policy to improve compliance and access to complete the PHA. The key is command emphasis from the Detachment level up to Group. This is a provider-driven effort. We must emphasize the care and health of our Soldiers.

A couple reminders:

1) All deployment waivers must be submitted to the U.S. Army Special Forces Command (Airborne) US-ASFC (A) Surgeon's office, which will then forward them to Special Operations Command Central (SOCCENT) for approval. This is a recent change and will be published in the upcoming MOD X Deployment Guidance.

2) The policy letter for the use of ImPACT to replace the Automated Neuropsychological Assessment Metrics (ANAM) is on its way from U.S. Army Special Operations Command (USASOC). Please let me know if you are having any problems with implementing the ImPACT testing.

Lastly, I want to urge all Regimental providers (docs, PAs, medics) to submit lessons learned, case reports, etc, for publication – or at least on the 18D webpage.

Thank you for all that you do every day. Everyone must refocus, adapt, and grow as our optempo increases and our dwell time decreases. We must do everything in our power to take care of our Soldiers. We need to increase our emphasis on prevention. Please look at your Tactical Human Organization Rapid Rehabilitation and Reconditioning (THOR3) assets and use them to the fullest.

De Oppresso Liber!



USSOCOM Education and Training Update

LTC Doug McDowell, APA-C

Director of Medical Education and Training



Since the issuance of the last journal publication, there have been a number of documents, all Army activities (ALARACTs), and memorandums that have come to our awareness. As they reach our office we will strive to include these aforementioned items that involve us in the SOF arena to further the readiness and knowledge of those in our areas of operation. The following include a documentation card at point of injury, global patient movement of in-garrison and deployed burn patients, burn center referral criteria, and changes to SOF TCCC Medic Kit. If you have pertinent data, memos, etc, please forward them to us for evaluation and inclusion into the journal.

SUBJECT: TACTICAL COMBAT CASUALTY CARE (TCCC) CARD FOR POINT-OF-INJURY DOCUMENTATION

REF/A/AR 40-66/MEDICAL RECORD ADMINISTRATION AND HEALTHCARE DOCUMENTATION/RAPID ACTION REVISION PENDING PUBLICATION//

REF/B/FM 4-02.10/THEATER HOSPITALIZATION/03JAN05//

REF/C/DA FORM 7656/TACTICAL COMBAT CASUALTY CARE CARD// REF/D/DD FORM 1380/U.S. FIELD MEDICAL CARD/DEC91//

1. (U) LESS THAN TEN PERCENT OF CASUALTIES WOUNDED-IN-ACTION HAVE PRE-HOSPITAL CARE DOCUMENTED IN THEIR ELECTRONIC MEDICAL RECORD. OF THAT TEN PERCENT, LESS THAN ONE PERCENT HAS THE REQUIRED INFORMATION DOCUMENTED TO ASSESS THE CARE RENDERED AT THE POINT-OF-INJURY (POI).
2. (U) EFFECTIVE IMMEDIATELY, ALL FIRST RESPONDERS AT POI WILL DOCUMENT MEDICAL TREATMENT PROVIDED AT POI, LEVEL I, AND LEVEL II COMBAT CASUALTY CARE ON A DA FORM 7656, TACTICAL COMBAT CASUALTY CARE CARD (TCCC) (SEE ATTACHMENT). THE TCCC CARD (DA FORM 7656) CAPTURES CRITICAL DATA ELEMENTS NECESSARY TO ENSURE CONTINUITY OF CARE FROM THE POI TO THE SUSTAINING MEDICAL TREATMENT FACILITY.
3. (U) THE PENDING REVISION TO AR 40-66 (CH 11-1) LISTS THE SPECIFIC LEVELS OF CARE FOR USE OF THE US FIELD MEDICAL CARD (DD FORM 1380) BY MEDICAL PERSONNEL. CHAPTER 15 AND TABLE 15-1 LIST THE SPECIFICS FOR USE OF THE TCCC CARD (DA FORM 7656).
4. (U) THE TCCC CARD (DA FORM 7656) WILL BE VISIBLE AND ATTACHED TO THE PATIENT OR INSERTED INTO THE LEFT UPPER ARM POCKET/LEFT LOWER PANTS POCKET, ONCE COMPLETED. UPON ARRIVAL AT A LEVEL III MTF, THE TCCC CARD WILL BECOME PART OF A PERMANENT MEDICAL RECORD, OR SCANNED, AND ENTERED INTO THE ARMED FORCES HEALTH LONGITUDINAL TECHNOLOGY APPLICATION - THEATER (AHLTA-T) AS AN ENCOUNTER IN THE EMERGENCY MEDICAL TREATMENT AREA. LEVEL III CSH COMMANDERS WILL ESTABLISH A PROCESS TO ENSURE ENTRY OF ALL MEDICAL INFORMATION RECORDED ON THE TCCC CARD INTO AHLTA-T.
5. (U) THE TCCC CARD (DA FORM 7656) IS NOW A COMPONENT OF THE IMPROVED FIRST AID KIT (IFAK). UPON RECEIPT OF THE TCCC CARDS, UNIT COMMANDERS WILL HAVE SOLDIERS INSERT ONE INTO THEIR IFAK. COMBAT MEDICS (68W) AND MEDEVAC CREWS

SHOULD CARRY EXTRA COPIES OF THE TCCC CARD. ROLE I, II, AND III TREATMENT FACILITIES WILL CARRY ADEQUATE NUMBER OF TCCC CARDS TO RESUPPLY ORGANIC UNITS/SOLDIER.

6. (U) THE UNIT OF ISSUE FOR THE TCCC CARD (DA FORM 7656) IS:

6.A. (U) ONE CARD FOR EACH IFAC.

6.B. (U) TWO CARDS FOR EACH COMBAT LIFE SAVER.

6.C. (U) THREE CARDS FOR EACH COMBAT MEDIC.

6.D. (U) THE DA FORM 7656 IS REQUISITIONED THROUGH NORMAL SUPPLY CHANNELS AND VIA THE FOLLOWING WEBSITE AT: [HTTPS://PTCLICK.HQDA.PENTAGON.MIL/](https://PTCLICK.HQDA.PENTAGON.MIL/) (UNDER SEARCH, ENTER DA FORM 7656).

7. (U) VISIT THE ARMY MEDICAL DEPARTMENT AND SCHOOL WEBSITE AT WWW.CS.AMEDD.ARMY.MIL (DEPLOYMENT PORTAL UNDER THE LEVEL I-II SECTION) FOR A TRAINING TUTORIAL ON COMPLETION OF DA FORM 7656, TCCC CARD.

8. (U) POCS:

8.A. (U) HQDA POC: LTC LARRY FRANCE, CLINICAL SERVICES DIVISION, HEALTH POLICY AND SERVICES, COM: 210-221-6616, DSN: 471-6616, E-MAIL: LARRY.FRANCE@AMEDD.ARMY.MIL.

8.B. (U) HQDA AOC-CAT: SURGEON ACTION OFFICER, COM: 703-693-4821, DSN: 223-4821, EMAIL: OTSG.AOCCAT@CONUS.ARMY.MIL.

9. (U) EXPIRATION DATE CANNOT BE DETERMINED.

Classification: UNCLASSIFIED

Caveats: NONE

ATTACHMENT

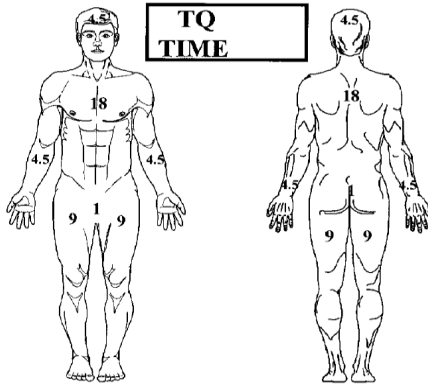
DA FORM 7656, TCCC CARD

FRONT
BACK

Name/Unit _____

DTG: _____ ALLERGIES: _____

Friendly Unknown NBC



GSW BLAST MVA Other _____

TIME				
AVPU				
PULSE				
RESP				
BP				

DA FORM 7656, XXX ###

A: Intact Adjunct Cric Intubated

B: Chest Seal NeedleD ChestTube

C: TQ Hemostatic Packed PressureDrsg

FLUIDS: IV IO

NS / LR 500 1000 1500

Hextend 500 1000

Other: _____

DRUGS (Type / Dose / Route):

PAIN

ABX

OTHER

First Responder's Name _____



UNITED STATES TRANSPORTATION COMMAND
SCOTT AIR FORCE BASE, ILLINOIS 62225-5357

30 DEC 2009

MEMORANDUM FOR (SEE DISTRIBUTION)

FROM: USTRANSCOM/SG
508 Scott Drive
Scott AFB, IL 62225-5233

SUBJECT: Global Patient Movement (PM) of In-Garrison and Deployed Burn Patients

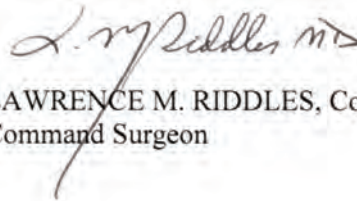
1. This policy letter addresses Department of Defense (DOD) movement of the burned patient, in-garrison or deployed, to a specialized burn center for care. Patients with significant burns, as defined by American Burn Association (ABA) criteria (<http://www.ameriburn.org>) or at attachment 1, will benefit from prompt consultation with a burn surgeon and transport to a burn center. All military burn patients requiring burn center care will be regulated to the US Army Institute of Surgical Research (USAISR) Burn Center, Brooke Army Medical Center (BAMC), Fort Sam Houston, Texas. Physicians treating burn patients shall stabilize the patient and begin fluid resuscitation following established burn care clinical practice guidelines, such as those available on the USAISR website (<http://www.usaisr.amedd.army.mil/cpgs.html>).
2. The treating physician shall initiate the PM process and contact the USAISR Burn Center designated representative. The governing Patient Movement Requirements Center (PMRC) shall assist the sending physician with appropriate recommendations for the PM process. Physician-to-physician communication is enormously valuable in developing the optimal movement plan for each patient. The USAISR is committed to providing timely and rapid access to all providers who call the Burn Center for consultation at 210-222-2876 or DSN 312-429-2876. Timely and accurate feedback is needed to ensure process improvement and optimal care.
3. Burn patients who meet ABA burn center referral criteria shall be regulated for movement precedence (urgent, priority, or routine) in consultation with the Theater Validating Flight Surgeon (VFS), USAISR and the referring physician, and the patient movement request shall be placed in the TRANSCOM (US Transportation Command) Regulating and Command & Control Evacuation System (TRAC2ES). If TRAC2ES is not available, direct contact with the servicing PMRC is recommended to facilitate patient movement. The USAISR Burn Center will provide the name of the accepting burn surgeon which will be documented in TRAC2ES by the referring facility. Delay or inability to contact the Burn Center directly should not delay the processing of the PMR.
4. USAISR will determine if a burn patient requires the USAISR Burn Flight Team for transfer. The USAISR Burn Flight Team is a Special Medical Augmentation Response Team with initial US Air Force (USAF) Critical Care Air Transport Team (CCATT) training and specialty expertise in burn care and inhalation injury, consisting of one or more burn surgeons, Burn Intensive Care Unit (BICU) nurses and respiratory care technicians.

a. If determined by USAISR that a Burn Flight Team is not required based on the severity of injury or when time and distance may significantly delay care, a USAF CCATT will attend all critically ill burn patients.

b. Non-critically ill burn patients who meet ABA criteria for burn center referral may be transported without a CCAT Team if the treating physician, Theatre Validating Flight Surgeon and the USAISR representative determine this to be appropriate to the burn patient's enroute care.

5. If unable to contact the USAISR Burn Center directly, the treating physician may request assistance from their supporting PMRC or the Global Patient Movement Requirements Center located at Scott AFB, Illinois (Phone numbers located at attachment 1). Validating flight surgeons (VFS) may also initiate consultation with USAISR and/or theatre burn surgeon if management questions arise concerning regulation of burn patients for movement.

6. This letter replaces USTRANSCOM SG Policy Letter "Utilization of Specialized Burn Patient Management During Patient Movement Operations" dated 7 Dec 2004. My point of contact for this policy is Colonel Nick Lezama at DSN 312-779-7208.



LAWRENCE M. RIDDLES, Colonel, USAF, MC, CFS
Command Surgeon

Enclosures

1. Distribution List
2. References
3. Burn Ctr Referral and PMRC Ph #s (Atch 1)

References:

1. JP 4-02, *Health Service Support*, 31 Oct 2006
2. USTRANSCOM Memorandum: *Utilization of Specialized Burn Patient Management During Patient Movement (PM) Operations*, 07 December 2004 (hereby rescinded)
3. AFI 41-307, IC-1, *Aeromedical Evacuation Patient Considerations and Standards of Care*, 10 August 2007
4. The United States Army Institute of Surgical Research, Joint Theater Trauma System, *Clinical Practice Guidelines*, Updated November 2008, <http://www.usaisr.amedd.army.mil/cpgs.html>
5. The American Burn Association, *Burn Center Referral Criteria*, <http://www.ameriburn.org>

Attachment 1

BURN CENTER REFERRAL CRITERIA

A burn center may treat adults, children or both. Burn injuries that should be referred to a burn center include the following:

1. Partial-thickness burns of greater than 10% of the total body surface area
2. Burns that involve the face, hands, feet, genitalia, perineum, or major joints
3. Third-degree burns in any age group
4. Electrical burns, including lightning injury
5. Chemical burns
6. Inhalation injury
7. Burn injury in patients with preexisting medical disorders that could complicate management, prolong recovery, or affect mortality
8. Any patients with burns and concomitant trauma (such as fractures) in which the burn injury poses the greatest risk of morbidity or mortality. In such cases, if the trauma poses the greater immediate risk, the patient's condition may be stabilized initially in a trauma center before transfer to a burn center. Physician judgment will be necessary in such situations and should be in concert with the regional medical control plan and triage protocols.
9. Burned children in hospitals without qualified personnel or equipment for the care of children
10. Burn injury in patients who will require special social, emotional, or rehabilitative intervention

*Excerpted from Guidelines for the Operation of Burn Centers (pp. 79-86)
Resources for Optimal Care of the Injured Patient 2006
Committee on Trauma
American College of Surgeons*

PMRC Phone Numbers (name/location/time zone/DSN phone number)

GPMRC (Scott AFB, IL) CST – DSN 312-779-4200/4201
PMRC-E (Ramstein AB, GE) CET – DSN 314-480-8040/2264/2643
PMRC – P (Hickam AB, HI) HST – DSN 315-448-1602/8735
JPMRC (Al Udeid AB, Qatar) - AST – DSN 318-436-4417/4418



UNITED STATES SPECIAL OPERATIONS COMMAND

Office of the Command Surgeon
7701 TAMPA POINT BOULEVARD
MACDILL AIR FORCE BASE, FLORIDA 33621-5323

SOCS-SG

21 September 2009

MEMORANDUM FOR

UNITED STATES SPECIAL OPERATIONS COMMAND, SOAL-SW, 7701 TAMPA POINT BLVD, MACDILL AFB, FLORIDA 33621-5523

UNITED STATES SPECIAL OPERATIONS COMMAND, SOAL J-4, DIRECTOR OF LOGISTICS, 7701 TAMPA POINT BLVD, MACDILL AFB, FLORIDA 33621-5523

SUBJECT: Configuration Change to Special Operations Forces, Tactical Combat Casualty Care Medic Kit

1. This memorandum directs an immediate configuration change to the Special Operations Forces (SOF) Tactical Combat Casualty Care (TCCC) medic kit. This configuration change is directed pursuant to a request from the SOF TCCC Integrated Product Team made at their meeting on 4 June 2009. The Program Manager (PM) SOF TCCC should take necessary action to replace the 400mcg Fentanyl pack in the medic kit with an 800mcg Fentanyl pack. The 800mcg Fentanyl pack is hereby identified as the appropriate level of care for SOF personnel in combat environments.

2. The 400mcg Fentanyl packs should continue to be fielded until on-hand quantities are exhausted and any remaining procurement options for this item should not be exercised. Since the 800mcg Fentanyl pack does not have an assigned National Stock Number (NSN), the PM SOF TCCC is directed to take necessary action to have an NSN assigned to the requested item.

3. The National Drug Codes (NDC) for the items involved in this configuration change have been verified with the U.S. Army Medical Materiel Agency. Preliminary analysis of this configuration change reflects a minimal impact on the overall cost of the subject kit and additional funding will not be needed.

- a. Current item: 400mcg Fentanyl
 - 1) NDC: 6505NCM060544
 - 2) Nomenclature: Transmucosal Fentanyl 400mcg
 - 3) Unit price: \$27.75
 - 4) Requested quantity: PG/4
- b. Requested item: 800mcg Fentanyl
 - 1) NDC: 00555-1083-01; Alternate NDC: 55235-0073-30
 - 2) Nomenclature: Transmucosal Fentanyl 800mcg
 - 3) **Unit price: \$55.00**
 - 4) Requested quantity: PG/4

P 140719Z JAN 10
 FM PTC WASHINGTON DC//ALARACT//
 TO ALARACT
 ZEN/RMY/OU=ORGANIZATIONS/OU=ADDRESS LISTS/CN=AL ALARACT(UC)
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 SUBJ: ALARACT 010/2010 - ENHANCEMENTS TO PRE-HOSPITAL BATTLEFIELD CARE, COMBAT LIFESAVER PROGRAM AND UNIT ASSEMBLAGE.
 UNCLASSIFIED//
 UNCLASSIFIED//FOR OFFICIAL USE ONLY.
 THIS MESSAGE HAS BEEN SENT BY THE PENTAGON TELECOMMUNICATIONS CENTER ON BEHALF OF DA WASHINGTON DC//DASG-HSZ//DAMO-DASG//
 THIS ALARACT MESSAGE IS SENT ON BEHALF OF THE SURGEON GENERAL//
 SUBJECT: ENHANCEMENTS TO PRE-HOSPITAL BATTLEFIELD CARE, COMBAT LIFESAVER PROGRAM AND UNIT ASSEMBLAGE.
 REF/A/DEFENSE HEALTH BOARD MEMORANDUM/TACTICAL COMBAT CASUALTY CARE IN MINIMIZING PREVENTABLE FATALITIES IN COMBAT/08AUG09//
 REF/B/CTA 8-100/ARMY MEDICAL DEPARTMENT EXPENDABLE/DURABLE ITEMS//17DEC04//
 REF/C/THE COMBAT LIFESAVER PROGRAM WEBSITE@ [HTTP://WWW.CS.AMEDD.ARMY MIL/CLSP//](http://www.cs.amedd.army.mil/clsp/)
 REF/D/HQDA ALARACT 355/2009/CORRECTED COPY TACTICAL COMBAT CARE (TCCC) CARD FOR POINT-OF-INJURY DOCUMENTATION/24DEC09//

1. (U) RECENT REVIEW OF TACTICS, TECHNIQUES AND PROCEDURES FOR PRE-HOSPITAL BATTLEFIELD CARE HAVE PROMPTED SEVERAL ENHANCEMENTS TO TRAINING AND EQUIPPING THAT WILL ALLOW THE ARMY TO ADAPT TO CURRENT CONFLICTS TO ENSURE MAXIMUM SURVIVABILITY ON THE BATTLEFIELD. THESE ENHANCEMENTS INCLUDE CHANGES TO COMBAT LIFESAVER (CLS) TRAINING, A CARD FOR POINT-OF-INJURY (POI) DOCUMENTATION BY FIRST RESPONDERS (DA FORM 7656, TACTICAL COMBAT CASUALTY CARE CARD), AND A RECONFIGURED CLS BAG.
2. (U) CHANGES TO CLS TRAINING.
 - 2.A. (U) THE NEW MODIFIED CLS TRAINING WILL PROVIDE INCREASED EMPHASIS ON HEMORRHAGE CONTROL, EMPHASIS ON TACTICAL MOVEMENT OF CASUALTIES, USE OF HYPOTHERMIA PREVENTION BLANKETS AND TRAINING ON THE TACTICAL COMBAT CASUALTY CARE CARD. TRAINING ON INTRAVENOUS LINE PLACEMENT AND IV FLUID ADMINISTRATION HAS BEEN DISCONTINUED.
 - 2.B. (U) THE NEW EDITION OF THE CLS COURSE (EDITION "C") IS CURRENTLY AVAILABLE AND NEW SLIDES HAVE BEEN POSTED TO THE CLS WEBSITE AT: [HTTP://WWW.CS.AMEDD.ARMY.MIL/CLSP/](http://www.cs.amedd.army.mil/clsp/). UNITS SHOULD ORDER THE NEW EDITIONS OF IS0871 STUDENT SELF-STUDY GUIDE, IS0873 INSTRUCTOR MANUAL, AND IS0875 EXAMINATION MANUAL IN ACCORDANCE WITH CURRENT PROCEDURES. EDITION "B" BECAME OBSOLETE ON 01 JAN 10.
3. (U) POINT-OF-INJURY DOCUMENTATION PROCEDURES.
 - 3.A. (U) IN JULY 2009, A RISK REDUCTION TASK FORCE APPROVED THE USE OF DA FORM 7656, TACTICAL COMBAT CASUALTY CARE (TCCC) CARD AS THE DOCUMENTATION TOOL FOR USE BY FIRST RESPONDERS AT THE POINT-OF-INJURY. IN ADDITION, HQDA PUBLISHED REFERENCE "D" ON 24 DEC 09 DIRECTING THE USE OF THE TCCC.
 - 3.B. (U) UNIT OF ISSUE IS 1/INDIVIDUAL FIRST AID KIT (IFAK), 2/CLS, AND 3/COMBAT MEDIC.

- 3.C. (U) DA FORM 7656 CAN BE REQUISITIONED THROUGH NORMAL SUPPLY CHANNELS AND VIA THE FOLLOWING WEBSITE AT: [HTTPS://PTCLICK.HQDA.PEN TAGON.MIL/](https://PTCLICK.HQDA.PEN TAGON.MIL/) (UNDER SEARCH, ENTER DA FORM 7656).
4. (U) RECONFIGURED CLS BAG.
- 4.A. (U) EFFECTIVE IMMEDIATELY, UNITS ARE REQUIRED TO COORDINATE WITH THEIR MEDICAL SUPPLY SYSTEM OR NEXT HIGHER MEDICAL TREATMENT FACILITY (MTF) TO RECONFIGURE ALL CLS BAGS TO THE NEW SET.
- 4.B. (U) CHANGES TO UNIT ASSEMBLAGE (UA) 245B, MES-COMBAT LIFESAVER-2009, INCLUDE: A NEW EXTERNAL BAG (NSN 6515-01-574-8111), BLANKET, HEATING, DISPOSABLE, PG 8 (NSN 6532-01-525-4062), SURVIVAL BLANKET (NSN 6532-01-524-6932), STRAP CUTTER (NSN 4240-01-568-3219), COMBAT APPLICATION TOURNIQUET (NSN 6515-01-521-7976), AND SHEAR LEASH (NSN 6515-01-540-7226). UNITS MAY PURCHASE THESE INDIVIDUALS ITEMS TO CONVERT THEIR EXISTING CLS ASSEMBLAGE TO THE NEW UA FUNCTIONALITY. THE CURRENT EXTERNAL BAG ITSELF MAY BE USED UNTIL THE END OF THE BAGS SERVICE LIFE.
- 4.C. (U) UNITS MAY ORDER THE COMPLETE UA 245B, MES-COMBAT LIFESAVER-2009, NSN 6545-01-572-9963, THROUGH NORMAL SUPPLY CHANNELS VIA INSTALLATION MEDICAL SUPPLY ACTIVITY (IMSA) OR THROUGH [HTTPS://DOD-EMAIL.DLA.MIL](https://DOD-EMAIL.DLA.MIL). REQUISITIONS SHOULD BE ROUTED TO THE DEFENSE SUPPLY CENTER PHILADELPHIA (DSCP). PRIORITY OF FILL WILL BE TO: (1) UNITS IN THEATER, (2) DEPLOYING UNITS, AND (3) GENERATING FORCE UNITS. SEE ATTACHMENT OF UA 245B, MES-COMBAT LIFESAVER-2009.
- 4.D. (U) ATROPINE AND DIAZEPAM (MEDICAL CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR DEFENSE MATERIEL ITEMS) ARE AUTHORIZED COMPONENTS OF UA 245B. THE CLS BAG WILL NOT CONTAIN THESE ITEMS WHEN FIELDIED. UNITS SHOULD ORDER ATROPINE AND DIAZEPAM SEPARATELY THROUGH THEIR SUPPORTING IMSA PRIOR TO DEPLOYING.
- 4.E. (U) THE CLS BAG IS A CATALOGED ITEM IN THE UNIVERSAL DATA REPOSITORY (UDR), MEDICAL SERVICES INFORMATION HEALTHCARE LOGISTICS SYSTEMS (MEDSILS) AT: [HTTPS://WWW.USAMMA.ARMY.MIL/ASSETS/APPS/QBCA I NDEX.CFM](https://WWW.USAMMA.ARMY.MIL/ASSETS/APPS/QBCA_I NDEX.CFM)), AND FEDLOG.
- 4.F. (U) FUTURE CHANGES TO THE CLS BAG WILL BE COMMUNICATED TO THE FIELD THROUGH VARIOUS METHODS INCLUDING THE U.S. ARMY MEDICAL MATERIAL AGENCY (USAMMA) WEBSITE LISTED BELOW, THE ARMY MEDICAL DEPARTMENT CENTER AND SCHOOL WEBSITE AT: [HTTP://WWW.CS.AMEDD.ARMY.MI L](http://WWW.CS.AMEDD.ARMY.MI L), AND E-MAILS TO DIVISION/BRIGADE/BATTALION SURGEONS, TRADOC, AKO, AND SUPPLY BULLETIN (SB). QUESTIONS REGARDING THE CLS BAG MAY BE DIRECTED TO USAMMA AT: [HTTP://WWW.USAMMA.ARMY.MIL/CONTACT_USAMMA.CFM](http://WWW.USAMMA.ARMY.MIL/CONTACT_USAMMA.CFM)
5. (U) POCS:
- 5.A. (U) HQDA POC: LTC LARRY FRANCE, CLINICAL SERVICES DIVISION, HEALTH POLICY AND SERVICES, COM: 210-221-6616, DSN: 471-6616, E-MAIL: LARRY.FRANCE@AMEDD.ARMY.MIL.
- 5.B. (U) HQDA AOC-CAT: SURGEON ACTION OFFICER, COM: 703-693-4821, DSN: 223-4821, E-MAIL: OTSG.AOCCAT@CONUS.ARMY.MIL.
6. (U) EXPIRATION DATE CANNOT BE DETERMINED.



LTC Craig A. Myatt, PhD, HQ USSOCOM Psychologist



Over the course of the past year, focus on psychological applications of sustaining operational capability for SOF has advanced from notional to tangible in the USSOCOM Command Surgeon's Office (SG). While direct access to various forms of consultation by psychologists in the Command Surgeon's Office is the most tangible immediate application, their role in the office also establishes a precedent. In fact, the role of a USSOCOM/SG command psychologist is distinctly different from the role of command psychologists assigned within the component commands. A brief presentation of those distinctions is worth reviewing, as those distinctions lend themselves to current capabilities at the USSOCOM headquarters for the Joint Special Operations planning, programming, budgeting, and execution, which support the development of a command-sponsored program encompassing SOF operational psychology and behavioral health applications.

At the USSOCOM headquarters, the command psychologist is a research psychologist working directly in the Command Surgeon's Office. That role differs from those among the component command psychologists who, as clinical psychologists, typically work outside of the Command Surgeon's Office. The component command psychologists (at component headquarters and group levels) serve as special staff to the commanders instead of working within Command Surgeon's Offices. Their role as command psychologists is less clinical in nature and more operational. Component command psychologists function more to support SOF operational requirements than to provide clinical services *per se*. They adhere to a "best practices" operational psychology model that is SOF-peculiar. The model includes assessment and selection, training, monitoring, and treatment of SOF personnel. Some, but not all, of those applications can be extended to family members. The component command psychologists at group level serve as SOF

enablers embedded in units. Consultation is only one among several psychological applications provided by component command psychologists.

The USSOCOM headquarters command psychologist is not directly involved in SOF operations and functions as a SOF supporter. The SOF supporter role for the USSOCOM command psychologist provides rationale for assignment in the Command Surgeon's Office. The Command Surgeon's Office offers the staffing and administrative support for the utilization of psychologists as staff officers at the USSOCOM headquarters. The precedent established by employing a psychologist in the Command Surgeon's Office reinforces the relationship between medical, cognitive, and behavioral factors associated with sustaining operational capability in SOF. It also generates a strategic link between component operational psychology support capabilities and services programs offering psychology support and behavioral health training. At the USSOCOM headquarters, the Command Surgeon's Office serves as the logical point of initiation for implementing the use of psychologists.

The SOF Human Capital Preservation Strategy does not restrict the use of psychologists to the Command Surgeon's Office, but certainly justifies their use in the Command Surgeon's Office. The continual review and assessment in the Command Surgeon's Office of behavioral health applications supports the role of human social interactions involved in Special Operations. The review and assessment also indirectly augment several existing medical-related programs aimed at providing tactical combat casualty care, expanded medical capabilities in battlefield environments, biomedical research and development, performance enhancement, injury prevention, and family care.

As the Resilience Enterprise Working Group (REWG) continues to explore and develop suitable and

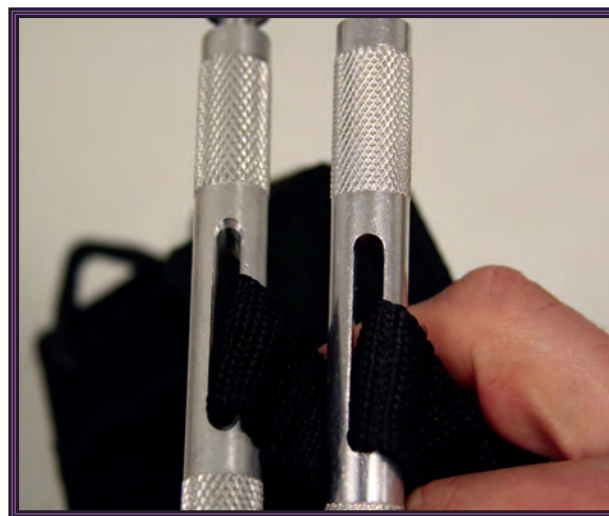
sustainable Joint Special Operations applications that promote high stress immunity for SOF personnel and their families, the role of psychologists in the USSOCOM Command Surgeon's Office could foster future opportunities to task or assign operational psychologists to the USSOCOM headquarters. The emergence of such a tasking or assignment within one of the J-staff elements would serve to enhance headquarters support for SOF operational psychology support capabilities within the

structure of a defined joint Special Operations program of record or independent of one. Though the initial planning and programming requirement for psychologists at the USSOCOM headquarters arose in the Command Surgeon's Office, the operational psychology model that promotes the use of embedded operational psychologists can be expanded to the headquarters to meet future requirements.



Need to Know

HOT!



Be advised that “lookalike” 1st Generation (1st Gen) Special Operations Forces Tactical Tourniquets (SOFT-T) have been issued in Afghan National Army AFAKs and are showing up in Afghan clinics. Below are photos of the U.S. government issued 1st Gen SOFTT, with examples of the lookalikes tourniquets below. Note that the appearance of the lookalike is similar (fig. 1 above); however, there are many critical differences.

First, and most critical, instead of a smooth, beveled edge in the slot of the windlass, the lookalike has a sharp edge (fig. 2 below), which cuts the tightening strap, rendering the tourniquet useless.

Second, the base of the lookalike is shortened, which places the buckle beyond the base (fig. 3 above).

Third, the base is comprised of soft, not stiff webbing, which lessens the tightening effect of the strap (fig. 3).

Finally, the lookalike **does not** have a product label at the end of the strap (fig. 4 below).



It should be noted that the 1st Gen SOFTT has not been produced in over 36 months. Therefore, except for the remaining tourniquets issued to individual units or in SOF Tac Sets, the 1st Gen SOFTT is no longer in circulation.

To order the current generation of the SOFTT, use NSN 6515 015307015.

News release

**U.S. Army Institute of Surgical Research Public Affairs Office
3400 Rawley E. Chambers Avenue
Fort Sam Houston, TX**

**Mike Feeley
Public Affairs Officer
U.S. Army Institute of Surgical Research
(210) 916-0859
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For Immediate Release

U.S. Army Institute of Surgical Research conducts fluid resuscitation meeting

(Fort Sam Houston, Texas) – It has been nine years since the Army held a formal meeting to review the science of fluid resuscitation for military casualties. So recently, the Army held a two day meeting that included leaders from the American College of Surgeons, American Association for the Surgery of Trauma, and Eastern Association for the Surgery of Trauma, experts from civilian trauma centers, special operations medical personnel and military medical leaders.

“The U.S. military has achieved unprecedented levels of battlefield survival through innumerable advances in medical care and personal protection. Those who are injured on the battlefield have an overwhelming chance of surviving due to advances in care,” said COL Lorne Blackburne, a trauma surgeon and the USAISR commander, and one of the meetings organizers.

He said, “In order to build on this success, the USAISR is relentlessly seeking further improvements in care. As part of this effort, the USAISR conducts research to deliver improved fluids to administer to patients who have suffered blood loss. This effort is especially crucial for combat casualties who may experience prolonged evacuation time due to continued fighting or long distance to a military hospital. Though battlefield injuries are uniquely military, civilian facilities can also experience penetrating trauma similar to those seen in combat, and as such have significant experience in treating trauma patients.”

In reviewing the results of several large, multi-center clinical trials that have been conducted in the past ten years that studied the selection of pre-hospital and in-hospital resuscitation fluids, the consensus of the experts at the meeting was that there is no data to recommend anything other than the military’s current practice. This practice includes the use of Food and Drug Administration approved fluids and blood products including red blood cells that have been previously frozen and stockpiled. In order to further refine the use of these FDA approved fluids and blood products, the U.S. Army Medical Research and Materiel Command conducts clinical trials in collaboration with leading civilian trauma centers. These trials will ensure that the Army continues to be the leader in resuscitation research and practice.

“Although the last prehospital fluid consensus USAISR meeting, nine years ago, was directed at the military use of fluid resuscitation, it rapidly became the standard of care for civilian prehospital field resuscitation and care as well. A similar outcome for this consensus meeting would be expected. Except for transport time and the more severely injured military combatant, the same physiology of resuscitation and hemorrhage control occurs in the pathophysiology of shock for the severely injured patient in civilian patient care. It would be correct to assume that the civilian prehospital providers and their medical directors, will rapidly adapt these same concepts of traumatic shock care,” said Norman McSwain, MD, trauma surgeon at the Spirit of Charity Trauma Center and the medical director of the PreHospital Trauma Life support course, who was actively involved in the USAISR consensus conference. Participants at the meeting also reviewed the products under development and identified dried plasma as the top research priority for improving pre-hospital fluid resuscitation. In addition, the group noted that there is a need for multisite clinical trials on the use of frozen blood before it can be considered for more robust use.

“Ideally, in the future, the USAISR and civilian trauma centers, will conduct multiple multicenter fluid resuscitation trials that will generate evidenced based data ultimately leading to improved pre-hospital care, said Dr. David Baer, Director of Research, USAISR.

For more information about the U.S. Army Institute of Surgical Research, visit (<http://www.usaisr.amedd.army.mil>).

The U.S. Army Medical Research and Materiel Command is the Army's medical materiel developer, with lead agency responsibility for medical research, development, and acquisition, medical logistics management, medical information management/information technology, and medical health facility planning.

The U.S. Army Institute of Surgical Research is part of the U.S. Army Medical Research and Materiel Command and is collocated with Brooke Army Medical Center. The USAISR is dedicated to both laboratory and clinical trauma research. Its mission is to provide requirements-driven combat casualty care medical solutions and products for injured Soldiers, from self-aid through definitive care across the full spectrum of military operations; provide state-of-the-art trauma, burn, and critical care to Department of Defense beneficiaries around the world and civilians in our trauma region; and provide Burn Special Medical Augmentation Response Teams.

Med Quiz

Picture This...

Brandon McNally, MD; Timothy McGraw, MD

While on deployment, a 42 year-old active duty male Soldier presented with a 1-year history of a worsening eruption on his trunk. Over several months, lightly hyperpigmented small lesions evolved into larger lesions of hyperpigmentation in the involved body locations. As the eruption progressed it became slightly pruritic prompting him to seek care. The eruption is pictured below. He stated that he had a similar eruption when he was younger, but did not recall how it had been treated. This was his first recurrence since that time. Otherwise, the patient had no significant past medical history.



Using the primary lesion definitions outlined in your SOF medical handbook, how would you describe the morphology of this lesion?

What is the differential diagnosis of this lesion?

MORPHOLOGY

Upon inspection of his skin, hyperpigmented macules coalescing into patches were scattered over his chest, back, upper arms, and shoulders. There was fine scale associated with the macules and patches along with evidence of excoriation of the affected area.

DIFFERENTIAL DIAGNOSIS

Tinea versicolor, pityriasis rosea, acute eczematous dermatitis, contact dermatitis, vitiligo, seborrheic dermatitis, and pityriasis alba

ETIOLOGY & PATHOPHYSIOLOGY OF TINEA VERSICOLOR

Tinea versicolor (TV) is a common fungal infection caused by a yeast that has two phases and prefers to grow in a lipid rich environment. The yeast is called *Malassezia furfur*, previously known as *Pityrosporum obiculare* (round form) and *Pityrosporum ovale* (oval form) which transforms to a pathogenic form and turns off melanin-producing cells in the skin.¹ The organism is part of the normal skin flora residing primarily around the hair follicles and concentrated in areas of increased sebaceous activity. Certain factors, especially heat and humidity, cause the yeast to convert from budding form to hyphated form. The hyphated form leads to the clinical presentation of TV.² TV is most common in young adults, and is less common with advancing age when sebum production is reduced or absent. In the tropics, cases of TV have been reported in children which is a direct result of the hot, humid environment in these regions.³ In fact, TV may affect up to 50% of the population in areas with warm, humid environments.⁴ *M. furfur* is not considered contagious. TV is a trivial disease and relatively common in the military population, but it typically does not affect the ability to perform duties. Therefore, it would not be necessary to evacuate a patient from theater if treatment was not readily available for TV.

DIAGNOSIS OF TINEA VERSICOLOR

The clinical appearance of TV is often characteristic, and its “spaghetti and meatballs” appearance on potassium hydroxide (KOH) microscopic examination is confirmatory. Wood’s lamp examination may show yellowish fluorescence of involved skin.⁵ Physical examination often shows either round or oval shaped hypo- (in darker skin) or hyperpigmented (in lighter skin) macules and patches that are sharply margined. Fine scaling can be appreciated on active lesions. Treated or burned out lesions usually lack scale.¹ Another technique that has

been described is scraping the patches with a surgical blade which usually yields a fine white powder.

Important parts of the history to obtain:

- Where on the body did the lesions first appear? If the lesions did not first appear on the trunk, consider a different diagnosis (such as vitiligo or pityriasis alba if lesions first appear on the face.)
- How old was the patient when the lesions first appeared? If the patient is either pre-pubescent or in their 5th decade or beyond, TV is less likely and one should consider a different diagnosis such as contact dermatitis or tinea corporis.
- Was there an initial primary lesion that preceded all others? If there was one specific patch that preceded the other lesions by two days to two months and was larger in appearance consider a different diagnosis such as pityriasis rosea.⁶ This initial lesion in pityriasis rosea is termed a “herald patch.”
- Was the eruption preceded by a viral illness? If so, consider a different diagnosis such as pityriasis rosea.
- How are the lesions distributed? If the lesions are mostly distributed in areas of intense sweating, TV is likely. If lesions are in a linear arrangement or a well delineated pattern consider a different diagnosis such as contact dermatitis.

In those patients with a typical history and presentation, the diagnosis of TV is usually straightforward and one should confidently proceed with treatment (see below).

TREATMENT OF TINEA VERSICOLOR

There are a number of proposed treatments for TV. Treatments range from topical application of antifungal lotions and shampoos to oral antifungal agents. Topical treatment is indicated for limited disease, but recurrence rates are high. Ketoconazole 2% shampoo, used as a single application or daily for three days, is highly effective and is the first line treatment of choice. For this treatment to be effective, the shampoo should be applied to the entire area affected and left in place for five minutes before rinsing. The shampoo should also be used to wash the scalp. Selenium Sulfide suspension 2.5% can also be applied similarly for 10 days. It can be applied to the entire affected area and washed off 24 hours later; this should be repeated once weekly for four weeks. Finally, antifungal creams such as miconazole, ketoconazole, and clotrimazole can be applied to the entire affected area one to two times daily for two to four weeks. Relapse rate of TV is higher with topical treatment. Oral treatment is usually given to patients with more extensive disease and

those who do not respond to conventional topical treatment. Oral treatments range from itraconazole, fluconazole, or ketoconazole. Oral terbinafine and griseofulvin are *not* effective. Fluconazole and ketoconazole are usually preferred because they are highly effective after just one dose. Fluconazole is a single dose of 300 or 400mg which can be repeated in two weeks if needed, and ketoconazole is given 400mg once. Relapse may still occur with oral treatment, if so, a prophylactic dose of 400mg administered monthly thereafter may be considered.⁷ Completing a vigorous workout one to two hours after taking oral treatment may help concentrate the treatment agent in and on the skin as the agent can be excreted in sweat.

Field Treatment of Tinea Versicolor

In the field, a single dose of an oral antifungal is often the preferred treatment due to ease of administration and availability. Frequently, one to two doses of fluconazole are all that is required. Topical treatment requires multiple applications, sometimes even daily, which can be impractical in the deployed and/or combat setting. If oral antifungals are not effective in treating the eruption and symptoms continue to worsen, reconsider the diagnosis by repeating history and physical examination. This will usually not be needed since the diagnosis and treatment of TV is frequently obvious and straight forward. If treatment is not easily accessible, patients do not need to be removed from duty or theater since TV is usually harmless and typically does not adversely affect the individual's mission capability.

RECOMMENDED PREVENTION OF TINEA VERSICOLOR

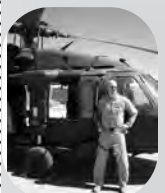
There are no proven strategies to prevent TV since the causal organism is part of normal body flora. Prophylactic doses of fluconazole or ketoconazole may be considered for long-standing cases or patients with multiple recurrences, but there is no way to predict when or if it will recur.³

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Brandon W. McNally, CPT, USA, MC is a 2009 Wayne State University School of Medicine graduate. He is currently stationed at Ft Sam Houston, TX where he is training as a transitional intern for the San Antonio Uniform Services Health Education Consortium. After his internship, CPT McNally aspires to pursue a residency in dermatology.



Timothy A. McGraw, Lt Col, USAF, MC, SFS is a 1994 USUHS graduate whose most recent deployment was to Bagram AB, Afghanistan in 2007-2008 where he flew dustoff missions and coordinated aeromedical evacuations out of theater. He completed his first residency in family medicine at Malcolm Grow Medical Center, Andrews AFB, MD in 1997. Assignments after this residency included Incirlik AB, Turkey, Elmendorf AFB, Alaska, and the Pentagon Flight medicine Clinic where he served as the Deputy Director and Director of Aerospace Medicine. Currently, Dr. McGraw is undergoing his second residency in dermatology at Wilford Hall Medical Center at Lackland AFB, TX.



Daniel Schissel, COL originated "Picture This" for the Med Quiz. He is a 1993 graduate of the Uniformed Service University of the Health Sciences and completed his internship with the family practice department at Fort Bragg in 1994. He then served as the 2/10th Special Forces Group (Airborne) Surgeon and followed on as the 10th SFG(A) Group Surgeon. He completed his residency training in dermatology at the Brooke Army Medical Center in 1999. COL Schissel is presently stationed in Heidelberg, Germany as a staff physician and the European Regional Medical Command Dermatology Consultant. He has been selected as the U.S. Army OTSG Dermatology Consultant. COL Schissel has authored the dermatology section of the new SOF manual, serves on the USSOCOM Medical Curriculum and Examinations Board, and is the U.S. Army Aviation Dermatology Consultant.

Photo Gallery



U.S. Army Specialist Fourth Class (SPC) Christopher Sharp, Dog Handler, 67th Mine Dog Detachment, and Dino, a MWD, lie low within the security perimeter of the Headquarters element of C Co. in case of enemy contact while participating in Operation SWIFT SWORD, an air assault mission designed to root out insurgent forces, uncover hidden weapon caches, and find possible training camps in Al Mara, Salah Ad Din Province, Iraq, conducted during Operation IRAQI FREEDOM. (Photo by: SPC Charles Gill) Date Shot: 4/23/2006

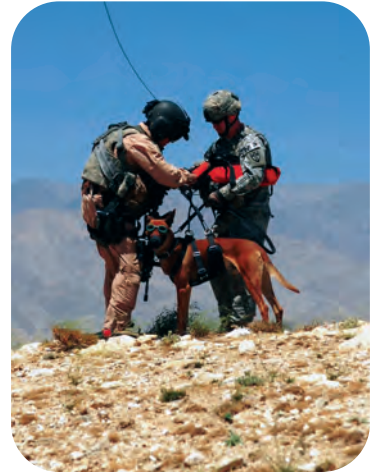


Army veterinarian with a puppy from the DOD breeding program.



Rin Tin, MWD, 354th Security Forces Squadron, 354th Mission Support Group, Eielson AFB, AK, waits for the command to enter a tube during routine training. (U.S. Air Force Photo by Senior Airman Joshua Strang/Released) Date Shot: 8/18/2004

U.S. Army 1SG Dean Bissey, left, C Co., 3rd General Support Aviation Battalion, 82nd Combat Aviation Brigade, hooks the hoist harness to SSG Michael Hile and his MWD, Ronnie, near Bagram Air Field, Afghanistan, during a canine-hoist training mission. Hile is assigned to 554th Military Police Company. (U.S. Army photo by SPC Aubree Rundle/Released) Date Shot: 7/17/2007



U.S. Army 1SG Dean Bissey, on ground, C Co., 3rd General Support Aviation Battalion, 82nd Combat Aviation Brigade, watches as SSG Michael Hile and his MWD, Ronnie, are hoisted off the ground near Bagram Air Field, Afghanistan, during a canine-hoist training mission. Hile is assigned to 554th Military Police Company. (U.S. Army photo by SPC Aubree Rundle/Released) Date Shot: 7/17/2007



U.S. AF SSgt Patrick Spivey, a dog handler assigned to the 2nd Security Forces Squadron, restrains MWD Chris as a veterinary technician draws blood during a regular annual checkup in the vet clinic at Barksdale Air Force Base, LA. (U.S. AF photo by A1C Alexandra Sandoval/Released) Date Shot: 2/5/2008



U.S. Navy MWD Don poses for a photograph of his K-9 Badge while on duty at the Port of Djibouti. Don and his handler, Master at Arms 2nd Class Kellyann Stietzel are assigned to Camp Lemonier and routinely stand duty at the Port of Djibouti inspecting ships, tugboats, and piers for possible explosives and narcotics. (U.S. AF photo by TSgt Dawn M. Price/Released) Date Shot: 4/20/2009



MWD Dag, who has just completed a successful tracking exercise, gazes into the eyes of a U.S. civilian worker, at Joint Security Station Loyalty, in eastern Baghdad, Iraq. (U.S. Army photo by SSG James Selesnick/Released) Date Shot: 5/15/2009



U.S. AF SSgt Steve Montez patrols the area with his MWD during a simulated attack on Osan Air Base, Japan, during Commando Warrior Ground Combat Skills training classes. Commando Warrior trains Security Forces personnel, both physically and mentally, and is divided into ground combat specialty tracks for flight, headquarters, MWD, radio telephone operators, and heavy weapons. (U.S. AF photo by AMN Gina Chiverotti/Released) Date Shot: 5/14/2006



U.S. Army SPC Chris Belleville, a MWD handler with the 25th Infantry Division, spends time with his canine, Cookie, to build trust and rapport in his living facility at Housing 5 at Joint Base Balad, Iraq. MWDs specialized in narcotics, explosives or are trained to track using their scent. (U.S. Air Force photo by Senior Airman Christopher Hubenthal/Released) Date Shot: 8/28/2009



U.S. Marine Corps Sgt Joseph Tullier, a dog handler with 1st Battalion, 12th Marine Regiment, and Paco, a MWD, perform different phases of aggression training at the Haditha dam in Haditha, Iraq. The dam is currently being used as the FOB for HQ and Services Company, 1st Battalion, 3rd Marine Regiment. (U.S. Marine Corps photo by Cpl Stephen M. Kwietniak/Released) Date Shot: 4/2/2007



Date Shot: 5/15/2009

U.S. MWD, Andy, sits by his find of explosives, during a practical exercise, in explosive detection, at Joint Security Station Loyalty, in eastern Baghdad, Iraq. (U.S. Army photo by SSG James Selesnick/Released)

U.S. Army SGT Aaron Hill, assigned to the canine section, 25th Infantry Division, holds back his MWD, Riko, who is growling at a simulated suspect at a training compound on FOB Diamondback, Iraq, during a K-9 demonstration. (U.S. Navy photo by SFC Carmichael Yopez/Released) Date Shot: 8/17/2009



Meet Your JSOM Staff

EXECUTIVE EDITOR

Virgil T. Deal, MD, FACS

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Prior to becoming the USSOCOM Command Surgeon, COL “Tom” Deal served in staff positions at USASOC, JSOC, 7th SFG, and XVIII Airborne Corps. He has commanded field and stateside hospitals and served as Chief of Surgery in the 86th Evac Hospital in ODSS and at Army and civilian community hospitals.

COL Deal obtained his medical degree from University of Tennessee College of Medicine, Memphis, Tennessee, 1974. He completed his general surgery residency at Brooke Army Medical Center 1977-1981 and is certified by the American Board of Surgery.

COL Deal completed his Flight Surgeon’s Course – 2003, Army War College – 1997, Command & General Staff College – 1994, AMEDD Officer Advanced Course – 1991, Military Free Fall School – 1977, Special Forces Officers Course – 1976, and Airborne School – 1975.

COL Deal has also completed Combat Casualty Care Leadership Course (C4A) –1991, Pre-Command Course, Fort Leavenworth – 1994, Senior Officer’s Legal Orientation, Charlottesville -- 1994, Combatant Commander’s Surgeons Course – 1996, AMEDD Pre-Command Course, Fort Sam Houston – 1998, Basic Life Support – current, Advanced Cardiac Life Support, Advanced Trauma Life Support, and Pilot, single engine, land, instrument.

MANAGING EDITOR

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Lt Col Landers joined the Army Reserve in 1987 and served as a nurse in a Combat Support Hospital unit for three years before switching services in 1990 to become an Air Force C-130 Flight Nurse. She is currently an IMA reservist assigned to HQ AF Reserve Command/SG and is attached to the SOCOM/SG office where she has been in charge of management, production, publication, and distribution of the JSOM since its inception in Dec 2000. Lt Col Landers has a Bachelors in Nursing and a Masters in Business Administration/Management. Her 24 year nursing career includes being a flight nurse in both the military and private sector, 15 years of clinical experience in emergency and critical care nursing, as well as being an EMT and a legal nurse consultant. She also served as the military liaison to the FL 3 Disaster Medical Assistance Team (DMAT). Prior to the SG office, Lt Col Landers’ experience at USSOCOM includes an assignment in the Center for Force Structure, Resources, Requirements, and Strategic Assessments.

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Special Forces Aidman's Pledge

As a Special Forces Aidman of the United States Army, I pledge my honor and my conscience to the service of my country and the art of medicine. I recognize the responsibility which may be placed upon me for the health, and even lives, of others. I confess the limitation of my skill and knowledge in the caring for the sick and injured. I promise to follow the in- maxim "Primum non nocere" ("First, thou shalt do no harm"), and to seek the assistance of more competent medical authority whenever it is available. These confidences which I will treat as secret. I recognize my responsibility to impart to others who seek the service of medicine such knowledge of its art and practice as I possess, and I resolve to continue to improve my capability to this purpose. As an American Soldier, I have determined ultimately to place above all considerations of self the mission of my team and the cause of my nation.



Pararescue Creed

I was that which others did not want to did what others failed to do. I asked And reluctantly accepted the I fail. I have seen the face of terror; joyed the sweet taste of a moment's hoped...but most of all, I have lived ten. Always I will be able to say, that my duty as a Pararescueman to save a my assigned duties quickly and efficiently, placing these duties before personal desires and comforts.



be. I went where others feared to go, and nothing from those who gave nothing, thought of eternal lonliness ... should felt the stinging cold of fear, and en- love. I have cried, pained and times others would say best forgot- I was proud of what I was: a PJ It is life and to aid the injured. I will perform

These things I do,
"That Others May Live."

A Navy Poem

I'm the one called "Doc"... I shall not walk in your footsteps, but I will walk by your side. I shall not walk in your image, I've earned answered the call together, on sea for help was given, I've been on the ocean or in the jungle wear- man, be it Sailors or Marines. and you think of calling him "squid," him did. And if you ever have to go out there and your life is on the block, Look at the one right next to you...



my own title of pride. We've an- and foreign land. When the cry there right at hand. Whether I am ing greens, Giving aid to my fellow So the next time you see a Corpsman think of the job he's doing as those before

I'm the one called "Doc".

~ Harry D. Penny, Jr. USN Copyright 1975

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